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STUDENT'S GUIDE

TO THE

DISEASES OF WOMEN.

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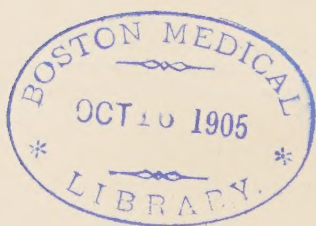
THE

STUDENT'S GUIDE

TO THE

DISEASES OF WOMEN.

BY

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WITH

SIXTY-THREE ILLUSTRATIONS.

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PREFACE.

In attempting to condense an account of the diseases peculiar to women within the limits of the present volume, I have omitted those subjects, such as extrauterine fœtation, and retroversion of the pregnant uterus, which are to be found in textbooks of midwifery. I have omitted also most of those gynæcological operations, such as the operation for ruptured perinæum and that for vesico-vaginal fistula, some account of which is contained in textbooks of surgery. For a fuller description of these the student is referred to larger works on gynæcology. An exception is, however, made in the case of the operation of ovariotomy, without some notice of which it appeared that the chapter on diseases of the ovaries would be incomplete. An additional reason for not omitting it was the fact that a description of antiseptic ovariotomy, as now performed by the most successful specialists, has scarcely yet found its way into students' textbooks of surgery.

The arrangement of the book is based, in the main, upon pathological anatomy, but I have departed from a strict order of sequence when, for convenience of grouping, it appeared desirable to do so. Thus malformations of the uterus, vagina, and Fallopian tubes are all grouped together, and prolapse of the uterus is considered in connection with prolapse of the vagina, bladder, and other pelvic viscera.

The sections on treatment I have endeavored to make

sufficiently full to be of service to practitioners as well
as to students. The engravings are chiefly selected with
a view to illustrate the instruments which a practitioner
is likely to want, and the mode of using them, as well
as the varieties of displacement of the uterus and adjacent
parts. For the figures of many of those instruments of
which the maker's name is not indicated in the woodcut, I
am indebted to the courtesy of Messrs. Krohne and Sese-
man. The figures showing different pessaries in position,
namely, Figures 26, 31, 35, and 45, are drawn to a scale
two-sevenths of the size of nature. In Figure 3, showing
the mode of introducing the uterine sound, and in Figures
40, 41, 42, and 43, illustrating the varieties of prolapse, the
scale is two-ninths of the natural size.

With respect to nomenclature, I have retained several
terms, such as " ovaritis," " ovariotomy," " vaginitis," and
" vulvitis," which are in common use, although not formed
according to etymological propriety, in preference to intro-
ducing such terms as the more strictly accurate " oopho-
rectomy," in place of " ovariotomy." I have, however,
discarded the awkward hybrid word " endocervicitis," since
its sense can be as conveniently expressed by the term " cer-
vical endometritis." In describing the histology of cancer
of the cervix and body of the uterus, while not differing
considerably from the chief authorities, I have followed, in
the main, the results of my own microscopical investiga-
tions.

14 St. Thomas's Street,
    June, 1879.

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DISEASES OF WOMEN.

CHAPTER I.

MEANS OF PHYSICAL DIAGNOSIS.

VAGINAL TOUCH AND BIMANUAL EXAMINATION.—
When a local investigation is considered desirable, the in-
ternal examination *per vaginam*, made by the index finger,
or the index and middle fingers of either hand, will in most
cases be the first exploratory measure which should be un-
dertaken. It should, however, be invariably combined with
abdominal palpation by the other hand placed externally
over the pubes; for, if this be omitted, it is quite possible
for the examiner to overlook the existence of tumors of con-
siderable size, or of pregnancy of advanced duration. The
position of the patient is of great importance. On the Con-
tinent and in America the dorsal position is universally
adopted, while in Britain it is more common to choose the
left lateral position. Each position has its own advantages.
The left lateral position, combined with the introduction
into the vagina of the right index finger, has the disadvan-
tage that the sensitive palmar surface of the finger can only
be turned towards the posterior and lateral vaginal walls,
and not towards the anterior wall, which it is most essential
to explore. It has the still greater drawback that it does
not allow of any effectual use of the conjoined or bimanual
manipulation. On the other hand, the lateral position
allows the perinaeum to be more fully retracted, so that the
finger can explore more deeply the posterior vaginal cul-

2

de-sac and posterior portion of the pelvis, while its flexor surface has the most convenient direction for this purpose. The dorsal position should always, therefore, be employed first, but it is generally desirable to turn the patient afterwards into the lateral position, either left or right, to complete the exploration.

By some it is preferred to introduce one or two fingers of the *left* hand into the vagina while the patient is in the left lateral position. This plan allows the bimanual examination to be effectually carried out, but has the inconvenience that it requires the patient to be placed somewhat transversely on the couch or bed, and that the flexor surfaces of the fingers cannot conveniently be turned to examine the posterior half of the pelvis without changing hands.

For examination in the dorsal position the patient should lie upon a firm, flat surface, as a hard mattress, the head, but not the shoulders, supported upon a low pillow. The knees should be flexed and abducted. The examining hand is then passed beneath the thigh, and the index finger, previously well lubricated, is introduced into the vulva from its posterior aspect, the perinæum being first sought for as a landmark. The remaining fingers are flexed into the palm, and upon the extent to which they can be doubled back, even more than upon the length of the finger, depends the length of reach of the examiner. In most cases it is preferable to use the index finger alone at first. If two fingers are used the vaginal spasm thereby excited more than counterbalances any advantage gained by the extra length of the middle finger. With a woman who has borne children, however, and whose vagina is capacious, two fingers may be used with advantage, especially in estimating the size and mobility of the uterus by the conjoined manipulation.

As it is carried up the vagina the finger ascertains the perviousness and capacity of that canal, and also whether its mucous membrane is in a normal condition or otherwise

as to smoothness, moisture, and temperature. Any undue
sensitiveness or spasm at the vulval outlet is also noted.
The cervix is then examined with reference to size, hard-
ness, position, and direction; and the os with reference to
its size, the regularity, smoothness, and consistence of its
lips, and the character of secretion as to quantity and te-
nacity.

In ascertaining the position and size of the body of the
uterus the conjoined manipulation is brought to aid. In
the normal condition nothing can be felt of the body of the
unimpregnated uterus through the posterior vaginal cul-de-
sac, but a portion of it can be reached by the finger in the
vagina in front of the cervix. To carry out the bimanual
method, the fingers of the left hand, passed beneath the
clothes, and laid upon the abdomen, should be pressed
firmly down into the pelvis, so as to push the fundus uteri
downwards and forwards (see Fig. 1). They should not be

FIG. 1.
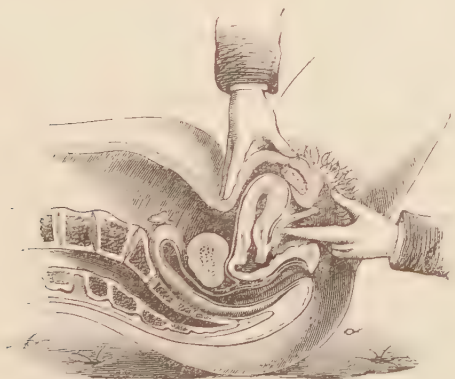
Method of Bimanual Examination.—(After Sims.)

applied too close to the pubes, for, in that case, the fundus
is apt to be pushed backward instead of forward. The
manipulation is also facilitated if the cervix be at the same

time pushed backwards by the finger in the vagina. The uterus is thus brought into a position somewhat of anteversion, and can be held firmly between the fingers of the two hands, and its size, shape, and any irregularities or prominences on its surface can be ascertained with much exactness. In carrying out this manipulation it is essential to obtain the utmost possible relaxation of the abdominal muscles by causing the patient to look up to the ceiling, with her head firmly rested upon the pillow, and by distracting her attention with conversation. If she be directed to breathe deeply, the examiner may take advantage of each expiration to sink the hand gradually deeper into the pelvis without causing painful pressure. If the fundus uteri be absent from its normal position, the external fingers may be brought down close upon that in the vagina. In nervous patients, when the abdominal muscles are held very rigid, the full advantage of this method sometimes cannot be obtained without the administration of an anæsthetic. A thick layer of fat in the abdominal walls also interferes with it. But even in such cases, although the uterus cannot be actually felt by the external hand, it is almost always possible to ascertain approximately its size and position by observing up to what level in the abdomen an impulse can be communicated to the finger resting upon the cervix.

While the uterus is thus balanced between the two hands, it is easy to estimate the mobility of the cervix, and of the whole organ, both to upward or downward, and to lateral displacements. At the same time any undue sensitiveness, either to pressure upon the fundus or cervix, or to either form of displacement, is noted. The examiner then quits the uterus, and explores in the same manner the rest of the pelvis. While the internal finger explores deeply the anterior vaginal wall, and all the vaginal culs-de-sac, and searches for any tumor or any abnormal resistance or tenderness, the external hand, at the same moment, defines the

upper limits, and ascertains the size, shape, consistency, and mobility of any mass which may thus be detected. If this can be fully carried out, it is scarcely possible for any swelling, however small, to escape detection. The *tactus eruditus* of the observer is called most fully into play in the estimation of slight deviations from the normal standard in the mobility of the uterus, and in the resistance of surrounding parts, which may be the only trace remaining of bygone inflammation. In thin persons, when the abdominal walls are not too tense, the ovaries, if in their normal position, may be caught between the fingers at a point between the fundus uteri and crest of the ilium, and distant about 1½ inches from the former. The right ovary and right half of the pelvis are best explored by using the right index finger internally, the left ovary and left half of the pelvis by the left index finger.

As a final stage, the patient may be placed on the left side, with the head and shoulders low, the knees well drawn up, and the hips near the edge of the couch. In this position the posterior portion of the pelvis can be explored most deeply by the index finger of the right hand, and this method is especially serviceable in searching for a slightly prolapsed ovary or a small tumor behind the uterus. The physician should accustom himself to use either hand with equal facility in both positions, so that, in case of serious illness, a patient may not be needlessly disturbed.

ABDOMINAL PALPATION COMBINED WITH PERCUSSION AND AUSCULTATION. — Abdominal palpation is in many cases not required. Frequently, the bimanual touch will assure the physician of the absence of any tumor or other condition upon which its employment could throw light, and thus, if the patient be dressed, the necessity of uncovering the abdomen will be avoided. If, however, the history of a case makes it seem possible that an abdominal tumor or pregnancy may exist, it is convenient to make abdominal

palpation the first step of the examination. And if the
bimanual touch have revealed the existence of
any tumor or swelling, or any notable enlarge-
ment of uterus, a further examination will be
necessary to ascertain the shape, size, consist-
ence, and attachments of the mass. The ex-
amination may be made through a thin gar-
ment, but ocular inspection is often desirable
to observe the appearance of the skin, the state
of the veins, and the presence of any dark
abdominal line. With palpation should be
combined percussion—which is especially nec-
essary for the distinguishing of phantom from
real tumors, and the diagnosis of flaccid cysts
or free fluid in the peritoneal cavity—and aus-
cultation, which may reveal the sounds of a
fetal heart, the uterine souffle in pregnancy or
in fibroid tumors, or friction-sounds on respi-
ration in the case of ovarian or other tumors.

EXAMINATION WITH THE UTERINE SOUND.
—The uterine sound is a metallic staff, marked
with notches at intervals of an inch (Fig. 2),
so that if, in withdrawing it, the finger be kept
upon the point corresponding to the os uteri,
the distance to which it has penetrated into
the uterus may be at once read off by the aid
of figures marked upon the stem. For the
terminal three or four inches the diameter of
the instrument should be less, so that this por-
tion of it may be readily bent to any desired
curve, but is yet firm enough to retain its
shape while being introduced, and to be used,
if required, for the replacement of the uterus.
A suitable combination of firmness and plia-
bility is attained if the instrument is made of

FIG. 2.

Uterine Sound.

pure copper, plated. The sound should terminate in a smooth, slightly bulbous extremity, which, for ordinary use, should be about one-eighth of an inch in diameter, that is to say, should just pass through gauge No. 9 of the French scale. But for use in cases of stenosis of the cervical canal, it is necessary to have a sound with a diameter not greater than one-tenth, or even one-twelfth of an inch.

For the use of the sound the patient is placed upon the left side, with the hips near the edge of the couch and knees

Fig. 3.
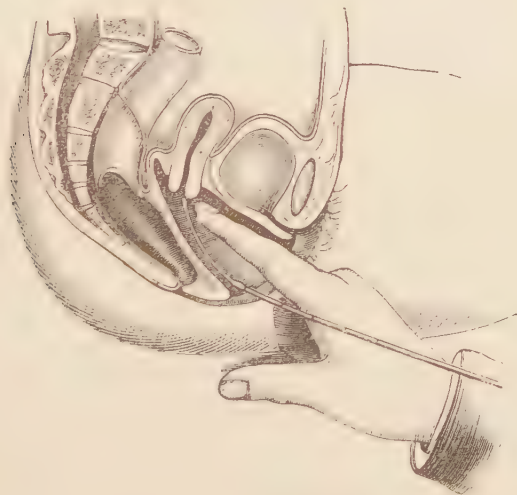
Mode of introducing Sound.

well drawn up. There are two methods of holding the instrument during its introduction. The one which I recommend is to introduce the index finger of the right hand into the vagina, and place it upon the os uteri, while the handle of the sound is held very lightly between the thumb and one or two fingers of the left hand, so that its stem rests between the thumb and index finger of the right hand, as

shown in Fig. 3. If the vagina is moderately capacious, and the os has its normal direction, the concavity of the sound should, from the first, be directed anteriorly. The handle must at first be held well forward, close to the patient's thighs, and it is then easy, with the instrument in this position, to guide its point along the finger up to the os, and insinuate it gently into the cervical canal, and so onward to the fundus, the handle meanwhile being gradually carried backward. If, however, the vaginal orifice is narrow and the perinæum tight, as in the case of virgins, or if vaginal touch has shown that the os looks forward, instead of looking nearly in the axis of the pelvic brim, as it normally does, it is more convenient, holding the sound in the same way, to direct its concavity at first backward. As soon as it has been passed well into the vagina, in the former case, or as far as it will go into the cervical canal, in the latter, its direction must be reversed by sweeping round the handle in a rather wide semicircle, so that the stem of the instrument describes a semicone, while its point does not move, but its terminal portion of two and a half inches rotates nearly on its own axis. This manœuvre resembles the " tour de maitre " of a surgeon in introducing a catheter in the male, and is precisely the converse of that employed in introducing the sound into a retroflexed uterus (see Fig. 28).

The sound is generally made with a projecting shoulder at its convex side, at a distance of two and a half inches from the end, to indicate the point which is normally just outside the os uteri, and the notches are also made upon its convex side. This shoulder interferes with flexibility, and is on the wrong side to be readily felt by the index finger of the right hand. For those, therefore, who introduce the sound in the way just described, it is far preferable to have the instrument made with a slightly prominent ring, readily felt from either side, in place of the shoulder, and to have

the notches marked upon the concave side, as shown in
Fig. 2.

In the second method of introducing the sound, one or
two fingers of the left hand are introduced into the vagina,
and placed upon the os, while the handle is held in the right
hand, the concavity of the intrument being directed for-
ward, and the point is thus guided into the cervix. This
plan has the drawback that it cannot conveniently be car-
ried out unless the patient is so placed that her trunk is
nearly transverse to the couch, a position which it is often
difficult to induce women to assume. Whichever method be
adopted, the physician should be able, with equal dexterity,
to make use of the other hand, placing the patient upon the
opposite side. The sound should not be used, as a matter
of routine, in every case, but only when it is likely to afford
some additional information, or to clear up some point which
previously remained doubtful. Its use is, as a rule, to be
entirely avoided in cases of cancer, of acute uterine or peri-
uterine inflammation, or when pregnancy is suspected, un-
less the diagnosis is of such extreme importance that it is
desirable to run the risk of inducing abortion. Even in
chronic periuterine inflammation it should be used only ex-
ceptionally, and with great caution. In all cases the direc-
tion of the uterine cavity should be previously ascertained,
as far as possible, by bimanual touch, and the instrument
should be warmed that it may not, by its coldness, excite
spasm of the cervix. If any great flexion of the uterus has
been detected, the sound should first be bent to a correspond-
ing curve, and its concavity turned in a suitable direction.

The first object in the use of the sound is *to measure
the length of the uterine cavity.* If any obstacle be met with
it should be overcome by changing the direction of the point,
or by very gentle and prolonged pressure, to which any
temporary muscular spasm will gradually yield. It is to
be remembered that a slight hindrance usually occurs at the

internal os, and that the point of the sound is often arrested there in consequence of flexion, or, much more rarely, in consequence of stenosis. Some pain is often felt as the sound passes the internal os, and frequently a sudden pain indicates the moment when the point has reached the fundus, which is more sensitive than other parts, and may be excessively so in metritis or endometritis of the body of the uterus.

A second object is *to learn the direction and course of the uterine cavity.* In this respect the information to be gained is as positive as that which an autopsy could afford, and it is by verifying by the sound the inferences deduced from the vaginal and bimanual touch that the physician is best able to acquire the necessary *tactus eruditus.* The conditions in which this indication is most important are when there are tumors near the uterus, which might be mistaken for its fundus; when the uterus is imbedded in inflammatory exudation, so that its position cannot be made out by palpation ; or when it is distorted by fibroid or other tumors in its substance.

A third use is *to ascertain the permeability and diameter of the uterine canal.* The mode of doing this will be described under the head of Stenosis of the Cervix. Useful information is also obtained as to the *sensitiveness of the internal surface of the uterus at its different parts,* but for this purpose the sound must be used with much caution. A further application is *to decide upon the presence or absence of any foreign body,* such as a retained ovum, polypus, or other tumor in the cavity of the uterus, and to determine its attachments. For *testing the mobility of the uterus* bimanual touch is generally sufficient, but the sound may be used to great advantage to determine how intimately the uterus is connected with an ovarian or other tumor. In the case of fixation by inflammatory adhesions alone, the use of the sound as a test of mobility is not without danger, and other means are then generally sufficient.

The use of the sound *in conjunction with external palpation* is sometimes of great value, especially when the body of the uterus cannot be defined by the bimanual touch alone, or when it is required to distinguish it from other masses felt in the abdomen, and ascertain its connection with them. For this purpose the right hand may be used most conveniently for external palpation, and the left for holding the handle of the sound, while the patient remains on the left side. In some cases of difficulty, however, it is preferable to place her in the dorsal position.

That the utmost gentleness is necessary in introducing the sound is shown by the fact that it has not very unfrequently penetrated a soft uterus, so that its point could be felt beneath the abdominal wall. In some cases it may have passed along a dilated Fallopian tube, but there is no doubt that more frequently it has actually pierced the uterine wall, and sometimes an aperture has remained, through which it could be repeatedly passed. In most such cases no serious symptoms have followed, but the occurrence is not to be regarded as altogether without danger. It is most likely to occur when the uterus is softened by degeneration after parturition or abortion, or by the presence of cancer, or when its wall is extremely thin from superinvolution.

The use of the sound for *replacement of the uterus* will be described under the heading of displacements of that organ (p. 85).

Dr. Marion Sims, followed by Dr. Thomas, and others in America, recommends as safer than the sound the uterine probe, which is only a little larger than the ordinary surgical probe, and is perfectly pliable, being made of pure silver or copper. This is used through a Sims's speculum, and the physician gives it the curve which he supposes the uterine canal to have, and keeps altering the curve, if necessary, until he can pass it without using the slightest force. This method has the drawback that the position of the uterus

may be modified by the introduction of the speculum, and the evidence derived from the probe thus rendered fallacious. Moreover, the operator thus sacrifices the great aid which the finger may sometimes afford in the case of flexion, by lifting up the fundus, and so partially straightening the uterus. Hence the dimensions of the vulva limit too much the movements of the handle of the probe to allow it to be passed in a case of extreme flexion, while a properly made sound can be equally well bent to any desired curve. Again, when the vulva is at all narrow, and especially in the case of a virgin, the passing of a uterine sound by a skilful hand generally gives the patient far less discomfort than the introduction of a Sims's speculum.

RECTAL TOUCH.—In the case of tumors or inflammatory thickenings behind the uterus, the rectal touch is often the most valuable of all modes of exploration. The finger can reach *per rectum* to a higher level than *per vaginam;* the magnitude of any swelling, and its relation to the recto-vaginal septum and the posterior pelvic wall, can be accurately determined, and the ovaries can often be very exactly made out. The patient may be placed in the dorsal position, and the method combined with abdominal palpation, but for exploration of the posterior and lateral walls of the rectum, the lateral position is preferable. If the patient be directed to bear down as the finger is passing the sphincter, less discomfort is caused by its introduction. In the case of virgins with a very small hymeneal aperture, rectal may replace vaginal touch as a means of ascertaining the condition of the uterus, but as a general rule rectal proves much more disagreeable than vaginal exploration. An inexperienced person may be somewhat puzzled in recognizing the cervix uteri as felt *per rectum,* but if the thumb be passed into the vagina, while the index finger is introduced into the rectum, the patient being in the dorsal position, the results of vaginal are at once brought into association with

those of rectal touch. The uterus may also be grasped between the thumb in the vagina and one or two fingers in the rectum, if the fundus is at the same time pushed down by the external hand. Rectal examination may be used in conjunction with a sound in the uterus to determine the connection of retro-uterine swellings with that organ; or in conjunction with a vesical sound in the bladder, in the case of absence or atresia of uterus or vagina; or to distinguish between a polypus and inversion of the uterus.

The scope of rectal exploration has been greatly extended by the method introduced by the late Professor Simon, namely, to place the patient under an anæsthetic, and introduce four fingers, or the whole hand, and, if necessary, a portion of the forearm into the rectum. Two or three fingers may even be passed into the commencement of the sigmoid flexure, and it is possible thus to reach as high as the lower portion of the kidneys. This method, when carried to its fullest extent, is not without danger, and has occasionally led to a fatal result. It should only be employed to establish a very important diagnosis as to the nature and connections of a tumor.

Certain special expedients, to aid the combination of vaginal and rectal touch with bimanual examination, are of use in difficult cases, especially for making out the attachments of a tumor. Thus, if the vagina is not sufficiently capacious, it may be stretched by preliminary plugging, or the use of an air-ball pessary. Another expedient is to place the patient on the left side, seize the cervix with tenaculum forceps, and draw it down as far as is possible without using undue force. The handles of the forceps being then given to an assistant to hold, one or two fingers of the left hand are introduced into the rectum, while the right hand, used externally, helps to push down the fundus if no tumor intervenes. In this way the pedicle of a tumor, or band of adhesion, may often be put on the stretch and so detected.

The fingers in the rectum may also by this method reach as high as the fundus, and any fault of development may be exactly made out. Dr. Hegar, who specially recommends this method, uses simple bullet forceps, having a catch at the handle, to draw down the cervix.

DIGITAL EXPLORATION OF THE BLADDER.—The anterior surface of the uterus and ovaries, and of any tumor in connection with them, may be very immediately reached by passing the finger into the bladder, after rapid dilatation of the urethra. For this purpose an anæsthetic is administered, and the urethra is dilated either by Weiss's three-bladed dilator, or by Simon's graduated conical bougies, used in succession, until first the little finger and afterwards the index finger can be introduced. The margins of the meatus may be slightly incised as a preliminary step. Some cystitis may be set up, and long-standing, if not permanent, incontinence of urine has occasionally followed; the plan should therefore only be adopted in order to make a diagnosis of great importance.

THE SPECULUM.—The use of the speculum is less important for diagnosis than to facilitate the application of remedies and the introduction of instruments, as in the operation for the cure of fistulæ. In diagnosis, it serves chiefly to reveal the appearance of the cervix, especially as to the presence or absence of any erosion, the character and abundance of the secretion issuing from the os, and also the condition of the vaginal walls. Out of all the numerous varieties of specula there are four of special value, and of these each have such distinctive merits that three, at least, of them are essential to the gynæcologist for use under different circumstances.

Ferguson's Tubular Speculum.—The speculum which concentrates far more light than any other upon the os uteri, and one which commonly brings the cervix readily into view, is Ferguson's speculum of silvered glass, with bevelled ex-

tremity, and trumpet-shaped entrance, whereby the rays of light are concentrated (Fig. 4). It has the further advantage that it is readily cleaned, and is unaffected by acids or

FIG. 4.
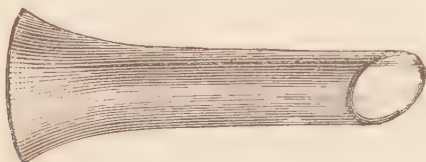
Ferguson's Speculum.

other fluids, while its sides protect the vagina from any application used, and a considerable quantity of fluid can be conveniently poured into it, if such a mode of application is desired. These specula can be obtained of toughened glass, whereby the objection of fragility is, in great measure, obviated.

For the introduction of the cylindrical or bivalve speculum, it is more usual in Britain to place the patient in the lateral, or, what is better, the semiprone position. This has the advantage in point of delicacy, but is open to the drawback that it requires a nearly horizontal light, such as is not easily obtained in a ground-floor room, and that the patient's legs, feet, and dress are apt to interfere with the illumination. The dorsal position has the great advantage that the effect of gravity then tends to bring the axis of the uterus more nearly into coincidence with that of the vagina, and so facilitates the exposure of the os. It should always be adopted, therefore, if any great difficulty is found in bringing the os into view, especially when this is due to anteversion of the uterus. In either case the speculum is introduced without exposure of the patient. The position and direction of the cervix are first ascertained by the index finger; then by two fingers the labiæ are separated and

perinæum retracted so that the bevelled tip of the speculum can be passed beneath it. The speculum is then gradually pushed on in a backward direction, stretching the perinæum still further back, while any painful pressure on the sensitive structures on the anterior wall of the vulva is avoided. The direction finally given is regulated by the position of the cervix as previously ascertained. If the os does not at once come into view, the speculum must be drawn back somewhat, and again pushed on in a different direction. Not unfrequently, when the uterus is anteverted, only the anterior surface of the cervix and anterior lip of the os are fully brought into view in this way, the whole circuit of the os not being fully seen. This difficulty may often be overcome by rotating the speculum till its projecting tip is anterior, in which position it tends to push up the fundus. Another plan is to draw the os into the centre of the field by means of a tenaculum hook, or by the sound passed just within the cervix. If this fails, the best plan is to use a bivalve speculum.

For illumination direct daylight is far superior to anything else, and, if the patient be in the dorsal position, a descending light, if the angle with the horizon be not greater than about 45°, answers excellently. If direct daylight cannot be obtained, it is often convenient to use a concave mirror, similar to a laryngoscopic mirror, having a rather large central aperture cut quite through the glass, and mounted upon a handle. This may be used to reflect either daylight or the rays of a lamp.

The Bivalve Speculum.—Of all valvular specula, the best is Cusco's bivalve speculum (Fig. 5). It is very easily introduced, and, in some respects, is the most convenient of all specula, especially in the fact that it is perfectly self-retaining. Its successful action depends upon a correct mode of introducing it. It is essential to ascertain first with the finger the exact direction and distance of the os. The spec-

ulum is tilted sideways to pass the vulva, then turned so that the blades are antero-posterior, and pushed on till their extremities are a little short of the os, but exactly in its direction, special care being taken that they do not pass beyond it into either cul-de-sac. The blades are then opened by the handles, the effect of which is that the fundus is

Fig. 5.
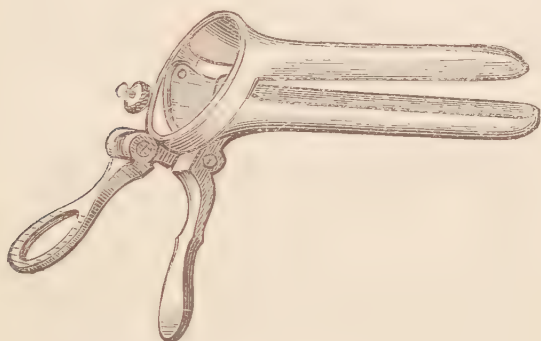
Cusco's Bivalve Speculum.

pushed up by the anterior blade, and the antero-posterior stretching of the vagina at the same moment draws the cervix downward and forward, so that the axis of the uterus is brought nearly into coincidence with that of the vagina. The lips of the os are also drawn somewhat apart, so that the interior of the cervical canal can be seen. As soon as the os is fully in view, the speculum is at once fixed by the screw at the side. The essential points in a good speculum are that the blades should be capable of wide separation, that they should themselves be wide enough to prevent the lateral vaginal walls encroaching on the field of view (for which purpose a width of about $1\frac{1}{2}$ inch near the extremity is desirable), and that they should not be too short. If one speculum only be used, the length of each

3

blade should be about $4\frac{1}{2}$ inches, but a shorter instrument may be used with advantage in a short vagina. All the modifications of valvular specula, in which three or four blades are employed, or the anterior blade is made much shorter than the posterior, interfere with this mechanism of bringing the uterus into a position of slight retroversion, and so do away with the special advantage of this form of speculum. In withdrawing the speculum, care must be taken not to allow the blades to close completely, and thereby pinch the vaginal walls.

Fig. 6.

Sims's Speculum.

Sims's Speculum.—Sims's univalve speculum (Fig. 6) has great advantages for special purposes, as when it is desired to introduce a tent or probe through the speculum, or to operate upon the cervix or vaginal walls. Its drawback is that it cannot be employed without an assistant, while a skilled assistant is necessary to give it its full value. The most important element in the use of this instrument is the position of the patient. As a preliminary step all dresses fastened round the waist must be loosened. The patient is placed on a high and firm couch or table, and the light must be nearly horizontal. She lies on her left side, in a semiprone position, with the head and shoulders low, and

the left arm drawn behind her, so that the sternum is rotated
forwards, coming very nearly into contact with the table.
The legs are flexed at right angles to the trunk, and the
right rather more than the left, so that the right knee lies
just above the left, in contact with the table (Fig. 7). The
nurse or assistant stands behind her, and pulls up the right
side of the nates with the left hand. The physician then
introduces the speculum, guiding it with the finger into its

Fig. 7.

Position for Introduction of Sims's Speculum.—(After Sims.)

position behind the cervix, draws back the perinæum so as
to convert the vagina into a straight canal, and gives the
instrument into the hand of the assistant, who holds it
firmly in the desired position, maintaining the retraction of
the perinæum.

The object of this position is to make the vulva the
highest point of the vaginal canal, and allow the effect of
gravity on the abdominal viscera and walls to draw the an-
terior vaginal wall forward and expand the canal into an
air-containing cavity, almost as effectually as if the patient
were in the knee-elbow position. When, however, the vagina
or vulva is narrow, the anterior vaginal wall does not fall
away sufficiently to allow the os to be seen, and it is then
necessary to hold it back either by a sound or similar in-
strument, or by a depressor made for the purpose. If the
cervix is still directed too much backward to expose the os

fully to view, or to bring it into a convenient position for the introduction of a probe or other manipulation, a small tenaculum hook is to be fixed in the anterior lip of the os. By this means the cervix is drawn forward until it is nearly in the axis of the vagina (see Fig. 12). This measure causes very little pain or inconvenience, and the shank of the hook serves at the same time for a depressor of the anterior vaginal wall. Various modifications of Sims's speculum have been invented with the object of attaching to the instrument a sacral plate and depressor, and thereby rendering it self-retaining, dispensing with the need of any assistant, and leaving the operator's hands free.

Neugebauer's Speculum.—A fourth speculum often of great service is Neugebauer's speculum (Fig. 8). This con-
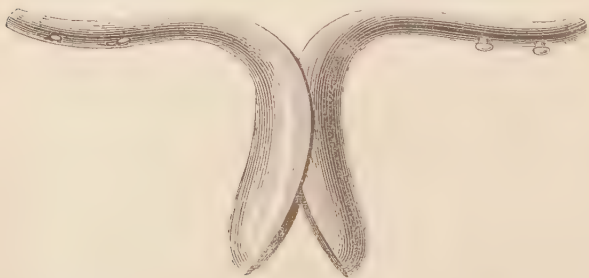
Neugebauer's Speculum, the blades of which may be united to form a Sims's Speculum.

sists of two blades, each resembling a Sims's speculum, and introduced in a similar way, but so adjusted that one blade slides within the other in such manner that the two blades in combination form virtually a bivalve speculum. It is inferior to Cusco's speculum in self-retaining power and in efficacy for bringing the cervix into the line of the vagina. Its special advantage is that it can be guided exactly into position by the finger; and thus it is generally superior to

all others if a speculum has to be used in a case of cancer of the cervix, other specula being liable to set up considerable hæmorrhage. Each blade should be about four inches long, and the handles may be so made as to clasp together in a reversed position to form a Sims's speculum (Fig. 6). Dr. Barnes has introduced a modification of this instrument under the name of the "Crescent Speculum." For each handle another blade of different size is substituted. Thus the two pieces make a series—three different sizes of speculum—Nos. 1 and 3 being in one piece, and Nos. 2 and 4 in the other. For the use of Neugebauer's speculum the patient may be either in the semiprone position or in the lithotomy position, with the nates overhanging the end of a table. The larger blade should be introduced first, and guided by the finger into its position behind the cervix ; the smaller blade will then slide into position within it.

DILATATION OF THE CERVIX BY MEANS OF TENTS.—
The diagnosis of morbid conditions of the mucous membrane of the uterus, and of the presence of tumors or the products of conception within its cavity, is in many cases rendered impossible by the closure of the os. Dilatation of the cervix is then the only method of detecting the disease, and is of still greater importance in allowing access for therapeutical means.

FIG. 9.

Sponge Tents.

There are two substances commonly used for the manufacture of tents—compressed sponge and the laminaria digitata, or sea-tangle, each of which has special advantages

under different circumstances. Sponge tents should be steeped in carbolic acid during their preparation, to render them antiseptic. They should be made of a uniformly conical shape, not bulging at the centre, and the string for their withdrawal should be attached at the upper extremity and pass through the length of the tent, since it is otherwise liable to break away and leave the greater part of the tent within the uterus. Laminaria tents should be perforated from one end to the other, to allow them to be fixed upon a stylet for introduction, and to render their expansion more rapid and complete.

Relative Advantages of Sponge and Laminaria Tents.— A sponge tent insinuates itself very closely into the interstices of the mucous membrane, and on this account it is less liable to slip out, and forms a more efficient plug in cases of hæmorrhage than the laminaria tent. The same property gives it an important therapeutic use in modifying the surface of the uterine mucous membrane, for which purpose it should be long enough to reach nearly to the fundus uteri (Fig. 9). It also causes less pain during its expansion than the harder laminaria tent. It has the disadvantage of more rapidly becoming offensive, but this is obviated, in great measure, by the preparation with carbolic acid, provided that the tent be not left in place longer than about twelve hours.

A laminaria tent is smoother, and can more conveniently be made of small size. It is, therefore, more easy to introduce, and is more suitable to commence with, when the cervix is small. In cases of flexion, it can be softened in warm water before introduction, and curved to suit the vaginal canal. It is capable of overcoming greater resistance in expansion than a sponge tent, and a wide dilatation may be effected by packing a number of laminaria tents side by side.

Mode of Introducing Tents.—In most cases a tent is introduced most easily by the tent-introducer, contrived by Dr.

Barnes (Fig. 11). It consists of a wooden handle carrying a curved stem, at the extremity of which stylets of various sizes can be screwed in, and over which slides a gum-elastic tube. The tent being fixed firmly upon the stylet, the whole instrument is introduced exactly like the uterine sound, and the tube is then held steadily against the os, the disk at its lower extremity giving a point of resistance to the finger, while the stylet is withdrawn. The instrument can be extemporized by cutting off the end of a gum-elastic catheter, so that the stylet projects about an inch, and mounting the perforated tent upon this projecting end. In using a sponge tent in this way, it should be smeared with some solid fat, such as lard, and it must be introduced rather quickly, before it has time to soften by absorption of moisture. To keep the tent in place till it has time to swell, a tampon

Fig. 10.

A Hollow Laminaria Tent. (Actual size.)

Fig. 11.
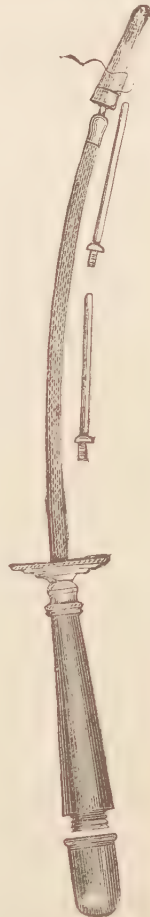
Barnes's Tent Introducer.

of cotton-wool, soaked in iodized glycerin or carbolic oil, should be placed beneath its extremity.

Another method of introducing a tent is to employ Sims's speculum and the semiprone position, and this plan should be adopted if difficulty is found in the introduction of a sponge tent on account of the softening of its point. By the tenaculum hook, the cervix is drawn nearly into the line of the vagina (Fig. 12), and the direction of the

FIG. 12.
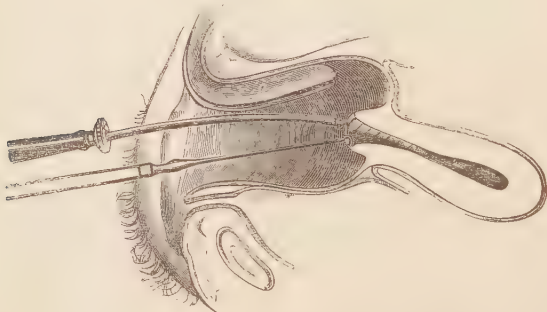
Mode of Introducing a Tent through Sims's Speculum.

uterine cavity is ascertained by the sound or probe. The tent is then guided into place either with a pair of forceps, or, more conveniently, by the tent-introducer. If laminaria tents are made about five inches long, instead of the usual length of about two inches, and are passed up nearly to the fundus, they are free from the risk of slipping out, but have the disadvantage that they hold the uterus forcibly in a position of retroversion, and hence cause more irritation. If pain is produced during the expansion of a laminaria tent, a morphia suppository should be administered. If the internal os is very rigid, pain may be great enough to call for more decided opiate treatment. In such case the tent may be so tightly constricted at one point as to prevent any great expansion, while it swells above and below. The extraction may then be somewhat difficult, and firm counter-

pressure by the finger against the cervix may be required to effect it.

Dangers from the Use of Tents, and Precautions Required. —No small number of cases is on record in which the use of a tent has been followed by metritis, pelvic cellulitis, or peritonitis, or even general and fatal septic peritonitis. The chief source of danger is the absorption of septic material by the lymphatics, a consequent rapid spread of inflammation along their course, and in some cases an almost immediate conveyance of septic contagion to the peritoneum. This danger may, to a very great extent, be avoided by suitable precautions. There are some cases, however, in which a risk is inevitable, as when a patient is exhausted by severe hæmorrhage, or is already the subject of septicæmia, but in which it may be justifiable to incur it, on account of the still greater risk in non-interference. Serious effects have more frequently occurred when a series of tents have been used to effect progressive dilatation. The most important precaution, therefore, is not to use tents more than twice in immediate succession, but if sufficient dilatation has not then been effected, to wait awhile before resuming the process. In dilatation for the purpose of diagnosis, or gaining access to a tumor, laminaria tents are the best to use. As many of these as can be introduced without the use of force should be placed side by side. This may be done either at the first sitting, if the cervix is not small, or after preliminary dilatation by a single tent. An antiseptic vaginal injection should be used before the insertion of a tent and after its removal, and a sponge tent should not be left in place much more than twelve, or a laminaria tent more than twenty-four, hours. If any rigor or rise of temperature occur, dilatation should at once be suspended. It is of the utmost importance also that the patient should be in bed when a tent is introduced, and should remain so until at least twenty-four hours after its

removal. Tents should not be used, unless for extremely urgent cause, when any recent acute inflammation is present; and in cases of pelvic peritonitis, even of an old or chronic character, they should be avoided as a rule, since such an inflammation is apt to be rekindled on slight provocation.

Use of Hydrostatic Dilating Bags.—In some cases, when the uterus is greatly enlarged by a tumor projecting into its cavity, and sufficient dilatation cannot be obtained by tents, the process may be completed by the aid of Dr. Barnes's hydrostatic dilators, which were designed especially for the gravid uterus.

CHAPTER II.

PHYSIOLOGY OF NORMAL MENSTRUATION.

BY the term menstruation, or catamenia, is understood a hæmorrhage from the mucous membrane of the body of the uterus, which normally recurs at regular intervals of, approximately, one month, and continues throughout the whole period of sexual activity in women, except during pregnancy and lactation. In a menstrual period there are three phenomena intimately connected together : First, active hyperæmia of the uterus and ovaries, with engorgement of the erectile tissue surrounding those organs ; second, rupture of one or more Graafian follicles, with escape of the contained ovules ; third, disintegration of the surface of the mucous membrane lining the body of the uterus in degree sufficient to cause rupture of the vessels and effusion of the menstrual blood. With the latter is associated an increased secretion from the cervix and vagina. There are several points in the physiology of menstruation, and in the relation between its several elements, as to which exact data are as yet wanting. Since the connection of menstruation with ovulation, first suggested by Power in 1821, was established by the researches of Négrier, Bischoff, Coste, Pouchet, Raciborski, and others, it has generally been believed that the mucous membrane becomes tumefied during the period, that the height of hyperæmia is coincident with the flow of menstrual blood, and that the follicle is ruptured at the same time or shortly after. It has also been thought that conception is most frequent shortly after the end of a period. Recent researches, however, especially those of Kundrat,

Engelmann, John Williams, and Leopold, while differing in important points, have agreed in showing that the mucous membrane attains its greatest thickness and development, and that hyperæmia is usually at its height, immediately before the commencement of a period. Anatomical evidence has also been adduced to show that the follicle is commonly ruptured before the onset of a period, though there are also cases recorded in which it was found not yet ruptured, but apparently on the point of rupture, during or immediately after menstruation. The view thus suggested by modern observers—which is the same as that first supported by Pouchet and Tyler Smith—is that in the intermenstrual epoch there is a growth of the uterine mucous membrane, to render it a fit receptacle for the ovum, and that the exfoliation of mucous membrane and discharge of blood is already a retrogressive change, analogous to the separation of the decidua in parturition, and denoting that the impregnation of that particular ovum has not taken place. The former process has been called by Dr. Aveling nidation (from nidus, a nest), the latter denidation. From this view would follow a conclusion contrary to that hitherto general, namely, that the fertilized ovum commonly belongs, not to the last menstrual period which occurred, but to the succeeding period which failed to appear. The same conclusion has been supported by Löwenhardt by evidence derived from the duration of pregnancy.

Recent evidence has also compelled us to regard the association of ovulation with menstruation as by no means an invariable, although a general, rule. In women whose ovaries are not developed, and in those who have been spayed before puberty, menstruation never appears. Thus it is proved that a stimulus to the nervous system, which originates in the ovaries, is necessary for the establishment of that function. A considerable number of cases have occurred, however, in which, after removal of both ovaries,

menstruation has continued more or less regularly for years. Anatomical evidence has also been found, on the one hand, of ovulation where no menstruation had ever taken place, and, on the other hand, of the absence of any sign of recent ovulation in women who had died during or immediately after menstruation. In rare cases, also, pregnancy has occurred in women who had never menstruated, though long past the age of puberty. Nevertheless it remains true that the association of ovulation and menstruation is the general rule. After removal of both ovaries, menstruation does usually cease from the time of the operation, as was the case in eight out of nine instances observed by Thomas. Some of the apparent exceptions may be explained on the ground that the ovaries were removed piecemeal, and that some small portion of their tissue may have been left. Moreover, amenorrhœa is a common result of cystic degeneration of both ovaries. Hence the probable conclusion is that the immediate source of the menstrual nisus, and of its periodical recurrence, lies rather in the nervous centres than in the ovaries, though the stimulus of the ovaries is necessary for its first establishment, and in most cases for its continuance. The final development and rupture of the Graafian follicle would then be rather the effect than the cause of the hyperæmia, and the exact period of its rupture might probably vary according to the stage which it had reached when the menstrual nisus commenced. It is also probable that Graafian follicles may occasionally be ruptured in the intermenstrual intervals, especially under the influence of the hyperæmia induced by coitus ; and it is certain that the menstrual period may pass without the rupture of any follicle, if there happen to be none sufficiently near to maturity.

Source of the Menstrual Blood.—That the effusion of blood does not depend upon hyperæmia solely is shown by the the fact that, when the uterine mucous membrane receives

the stimulus in nutrition due to the implantation of a fecundated ovum, no hæmorrhage occurs, although the hyperæmia increases to a higher point than that of menstruation. The first step leading to rupture of the vessels is therefore a disintegration of the mucous membrane, and a fatty degeneration of this tissue, preceding the commencement of hæmorrhage, has been described by Williams. On careful microscopic examination of the menstrual blood, groups of cells belonging to the uterine mucous membrane may frequently be found, especially during the first two days of the period; and not unfrequently minute shreds of membrane, showing the apertures of the uterine glands, generally denuded of their epithelial lining, are also seen. The completeness of the disintegration appears to vary in different persons, but exfoliation in larger pieces is a morbid condition, which will be noticed under the head of Membranous Dysmenorrhœa. As to the depth of the normal exfoliation, final proof is as yet wanting. Of recent observers, Williams maintains that the whole thickness of soft tissue, commonly regarded as mucous membrane, is thrown off every month, leaving only the extremities of the glands imbedded in the muscular coat, the inner layer of which he regards as belonging, in development, to the mucous membrane, and as being, in fact, the muscularis mucosæ. The regeneration he describes as beginning at the internal os, and extending towards the fundus. The proof is incomplete from the fact that the instances in which complete exfoliation was found were cases of death by acute febrile diseases, so that the disintegration might have been morbid. Kundrat and Leopold adduce cases to show that, even near, or shortly after, the end of a period, no more than the most superficial layer of mucous membrane was found wanting, and attribute the decrease of the thickness to diminution of œdematous swelling rather than to loss of

substance.   Engelmann denies any exfoliation of even the surface.

The view that permanent communications exist between the bloodvessels and the uterine glands, and that these are the source of the exudation of menstrual blood, may be regarded as now exploded.   The mucous membrane of the cervix normally takes no part in the outpouring of blood, and its surface remains intact.   The coagulation of menstrual blood is usually prevented in its admixture with the acid vaginal secretion.   If the quantity of blood is excessive, or if it is retained long within the uterus in consequence of stenosis or flexion, clots are formed.   The quantity of blood normally lost is estimated at from three to seven ounces.   The amount of loss depends in great measure upon the degree of active hyperæmia, as is shown by its increase from the effects of exercise, or in consequence of coitus.   The natural duration of the flow is from three to five days, but in some women it lasts habitually for seven or eight.   The period of recurrence, in women who are perfectly regular, usually varies from twenty-seven to thirty days.

Period of Possible Conception.—There are two considerations which render it very difficult to draw any positive conclusions as to the stage of the menstrual cycle at which it is possible, or usual, for conception to occur; first, that the life of spermatozoa within the uterus may be prolonged for certainly as much as eight days, and possibly for longer; and, secondly, that we have no evidence, in the human subject, as to the time occupied by the ovum in descending the Fallopian tube, or during which it may retain its vitality. There is no doubt that fruitful intercourse may occur at any part of the menstrual cycle, and that any method for preventing pregnancy by abstinence during any special period is unreliable.   That abstinence shortly after the period has no such effect is shown by the case of the Jews,

who are, if anything, more fertile than other nations. Strict observers of the Jewish law practice abstinence during five days for the period, and seven days for purification afterwards, reckoning from the end of the five days, or from the last appearance of blood, if the period lasted longer than five days, an interval which amounts to at least twelve days in all.* The converse fact that a single fruitful coitus may occur between four and ten days after the commencement of the flow is proved by cases recorded by Dr. Marion Sims, who considers the latter part of this period as the preferable time in order to insure pregnancy. It can scarcely be doubted that menstruation is really analogous, in some measure, to the æstus or rut of animals; although there is the important contrast that, in animals, coitus takes place only at the time of æstus; but, in the human subject, usually at any other time except that of menstruation. The latter circumstance, however, is rather the result of civilization and of a feeling of delicacy, for there is no doubt that an increase of sexual feeling does normally take place at the menstrual period as at that of æstus. Hence the common opinion that intercourse near the time of menstruation is more likely to prove fruitful is probably correct; but within what limits of time the uterine mucous membrane is capable of receiving an ovum remains as yet uncertain.

Commencement and Cessation of Menstruation.—The first appearance of menstruation usually coincides with the age of puberty, and the development of the breasts, the pelvis, and the hair on the pubes, as well as the mental changes which occur at the same time. The most frequent age is, in temperate climates, the fourteenth or fifteenth, or, somewhat less commonly, the sixteenth year; but variations between the tenth and twenty-first year are not very rare.

* See Leviticus xv : 19 to end.

The influence of climate is considerable, and in hot countries menstruation commences, on the average, about two years earlier, while it is, at the same time, more profuse. In arctic climates, on the other hand, its appearance is delayed to about an equal extent, and the quantity of blood lost is very small. Cases of precocious menstruation occasionally occur in childhood, and even infancy, and are then associated with premature development of breasts and pelvis, and probably with premature ovulation. In such a case pregnancy has occurred at the age of eight years.

The time of cessation of menstruation (climacteric period, menopause, or change of life) is, on the average, about the age of forty-five. Women who menstruate early do not generally reach the menopause early, but the contrary; and, when menstruation is established late, the same ovarian inactivity often leads to an early cessation. In very rare cases true menstruation may continue, and pregnancy be possible, as late as the age of sixty.

Symptoms and Concomitants of Menstruation.—In women of robust health no premonitory signs are noticed, but in those of more impressible nervous system for some days before the period is due the breasts often become firm, or even painfully hard, and may be the seat of neuralgic pain, a condition which generally disappears within a day or two after the commencement of the flow. At the same time there is an increased irritability of nerve-centres, which, in women subject to hysteria, epilepsy, or migraine, is shown by the greater frequency of attacks at this period. Sphygmographic observations have shown that the arterial pressure is increased before the onset of a period, and becomes lowered during its course. If congestion of uterus or ovaries is present, pelvic pain precedes menstruation by some days. In cases of hernia of the ovaries, these organs have been found to become swollen and tender a little before menstruation, and continue so during the period. Vaginal touch

during a menstrual period shows the uterus as well as the vagina to be turgid and soft. The soft condition of the uterus, however, is alternated with contraction, especially if any obstacle to the flow exists, and if death occurs during a period the muscular wall of the uterus is often found pale, from expulsion of the blood, while the mucous membrane, ovaries, and surrounding parts are highly congested. The cervix uteri, vagina, and vulva participate in the engorgement, and increased secretion from them precedes, accompanies, and follows the flow of blood. There is often a tendency to constipation shortly before the period is due, just as there is in early pregnancy, even before the uterus has enlarged sufficiently to produce any effect by pressure, and this constipation may be succeeded by relaxation of the bowels after the flow has commenced. Even in health some degree of fulness and of general lassitude is usually felt just before and for the first two or three days of the period—a condition expressed by the saying of women that they are " unwell."

CHAPTER III.

MALFORMATIONS OF THE UTERUS AND VAGINA.

THE Fallopian tubes, with the uterus and vagina, are developed from two distinct tubes, called Müller's ducts, which coalesce about the eighth week of fetal life throughout that portion which forms the uterus and vagina, the point where junction should begin being marked by the insertion of the round ligaments. The graver congenital deformities of these organs depend upon a complete or partial failure either in the development of one or both of these ducts, or in their junction, and it will therefore be convenient to consider such deformities, both of uterus and vagina, in conjunction.

ABSENCE OR RUDIMENTARY DEVELOPMENT OF UTERUS. —The uterus may be completely absent, or may be a rudimentary membranous body with or without an inclosed cavity. Frequently in such cases there is a single solid cervix, and separate horns containing small cavities, a condition which constitutes the *uterus bipartitus*. The ovaries may be absent or present, the vagina absent or short, while the external genital organs are normal. When the ovaries are present, distress may arise from an unrelieved menstrual molimen. In one such case Dr. Battey has performed the operation of spaying with a good result. The diagnosis is generally to be made by rectal touch in conjunction with bimanual examination, and may be aided by the introduction of a catheter, or of the finger into the bladder. When the vagina is entirely absent, women may marry in ignorance of their deformity, and may afterwards be anxious

for operative assistance. The attempt to make an artificial vagina, however, involves in these cases a risk of opening the peritoneal cavity.

The duct of Müller, on one side, may be formed normally, while that on the other is absent or imperfectly developed, and fails to coalesce fully with its fellow. This condition constitutes the *uterus unicornis*. The uterus is curved to one side and terminates in a point, from which the round ligament and other appendages take their origin. The rudimentary cornu, if present, is commonly attached about the position of the internal os, and may be pervious or not. Menstruation is usually normal. Pregnancy may occur in the developed horn, and proceed naturally. It may also take place in the rudimentary horn, and is then likely to lead to rupture, commonly before the end of the fourth month, and usually with a fatal result.

If both ducts are developed, but fail to coalesce completely, the *uterus bicornis*, or *uterus septus*, may be formed. In the former the body of the uterus is more or less bifid, as is the case in many animals; in the latter the externally normal uterus is divided by a septum into two halves. The septum may be incomplete, or may extend to the external os, and the vagina may be either single or double. Some recorded cases of superfetation are explained by pregnancy having occurred on the two sides of a *uterus bicornis*, or *uterus septus*, at an interval of some months. If there are two vaginæ, generally one only serves for coition, but sometimes the septum leads to difficulty in this respect and requires removal.

The uterus is often imperfectly developed, and then assumes one of two forms : (1) the *infantile uterus*, in which the cervix is naturally formed, but the body remains of the same relative size as during infancy, constituting only one-fourth or one-third of the whole length, and having relatively thin walls ; (2) the *generally ill-developed uterus,* in

which the normal relative proportion is maintained, but the whole organ is atrophic. The latter condition is often associated with stenosis of the external os and anteflexion, and will be further discussed under those headings. When the uterus is infantile, menstruation is generally absent; when it is generally ill-developed, it is either absent or scanty. The infantile uterus may be diagnosed by bimanual examination, which reveals the small size of the body, while the sound passes only to a length of from $1\frac{1}{4}$ to $1\frac{3}{4}$ inches, and can be felt through the thin fundus with unusual distinctness. The generally ill-developed uterus is distinguished from the infantile by the small size of the vaginal portion.

Treatment.—When the uterus is imperfectly developed, nutrition should be stimulated as much as possible by nourishing diet and the administration of iron, especially if there be any tendency to chlorosis. If the deficiency be not too great, an intrauterine stem pessary, and especially the galvanic pessary, which is the most powerful local stimulus to the uterus, may be tried. The mode of using it will be detailed under the head of Amenorrhœa.

ATRESIA OF THE UTERUS, VAGINA, OR VULVA.

All occlusions of the genital canal, at whatever point situated, and whether congenital or acquired, have a common effect in preventing the exit of the menstrual blood, when the body of the uterus itself is developed, and so lead to a similar group of symptoms. It is, therefore, convenient to consider the several varieties of atresia together.

CONGENITAL UTERINE ATRESIA is very rare, and may affect the external os, or, still more rarely, the whole cervix.

CONGENITAL VAGINAL ATRESIA is much commoner, and may consist either in complete or partial absence of the vagina, in an imperforate condition of the hymen, or in closure of the vagina by a transverse septum, which is generally situated immediately behind the hymen, and may

easily be mistaken for *atresia hymenalis*. In many cases in which there is apparently a total absence of the vagina, the lower part of the cavity distended by menstrual blood is irregular in shape, and appears to correspond partly to the cervix and partly to a portion of the summit of the vagina. No distinct external os is formed, and the cavity has thick muscular walls, like those of the uterus rather than those of the vagina.

ACQUIRED UTERINE ATRESIA usually affects some portion of the cervical canal. It may result from the application of the actual cautery, potassa fusa, strong acids, or even the solid nitrate of silver; from amputation of the vaginal cervix, especially when performed by the galvanic écraseur; from the presence of growths in the cervix, whether fibroid or cancer; or from any injury to the cervix. It may also be the effect of cervical catarrh, through adhesion of the granulations formed on opposite sides of the canal, especially when the passage is no longer kept patent by the flow of menstrual blood. It is not uncommon, therefore, in old women, especially when prolapsus of the uterus exists.

ACQUIRED VAGINAL ATRESIA is usually the result of sloughing of the vaginal walls after protracted labor, or, in rare cases, after abortion. It may also be the effect of injuries, of sloughing of the vagina after fevers, or of venereal ulceration. In some cases it is combined with vesical or rectal fistulæ. The labia majora are not uncommonly adherent in little girls, but the vagina is not completely closed thereby, and the adhesion is easily separated without any need for incision. This condition is not a fault of development, but may arise either during fetal life or after birth.

Results and Symptoms.—Congenital atresia usually attracts no attention during childhood, but occasionally, even in early life, an accumulation of secretion has taken place behind an occluding septum. As soon as menstruation commences, the menstrual blood collects behind the occlu-

sion, and begins to distend the genital canal from below upwards, first the vagina, if that is present, then the cervix, then the body of the uterus, and, lastly, the Fallopian tubes. Thus, in atresia of the hymen or at the lower portion of the vagina, the uterus does not participate in distension until quite a late stage. If, however, the atresia is about the situation of the external os, the whole uterus becomes dilated into a single cavity from the first, and the internal os is obliterated by distension, while the Fallopian tubes are much earlier affected than in the former case. During the intermenstrual intervals a considerable portion of the fluid part of the blood is re-absorbed, and thus the swelling formed diminishes during such intervals, while the retained fluid acquires a thick, treacly consistence, and dark appearance, but undergoes no putrefaction. The blood in the Fallopian tubes is not, in all cases, due to reflux from the uterus, but may be poured out into them under the stimulus of the morbid condition, as is proved by the fact that the uterine extremity of the distended tubes may be found quite narrow, or even occluded. Slight reflux of blood into the peritoneal cavity may occur, and the pavilions of the tubes often become adherent from this cause, but copious regurgitation does not often take place until the fluid has been partially evacuated. When the atresia is due to a thin membrane, a spontaneous termination, favorable or otherwise, may be brought about by rupture of the membrane under some sudden strain. Eventually the Fallopian tubes, or less commonly even the uterus itself, may rupture, and hæmatocele or fatal peritonitis be the result.

After the menopause the uterus may be filled by mucous fluid (*hydrometra*), a condition usually resulting from acquired atresia of the cervical canal. I have met with one instance in which the uterus became largely distended by pus in consequence of an atresia produced by cancer about the internal os.

Attention is commonly attracted to congenital atresia either by amenorrhœa continuing beyond the age of puberty, by inability to perform the act of coition, or by the effects of menstrual retention. In the last case there will be spasmodic pain, recurring more or less regularly at monthly intervals, and eventually a tumor in the hypogastrium, enlarging in association with the pain, and subsiding somewhat in the intervals. In some cases the atresia is not quite complete, and some slight escape of menstrual blood may occur.

Treatment. —When the occlusion consists only of a thin septum the operation for evacuation of the retained fluid is extremely easy, but in these, as well as in more difficult cases, there is grave peril of serious symptoms, and death has not unfrequently followed. The danger is in proportion to the degree of distension, and is especially great if the Fallopian tubes are involved. The accidents most likely to occur are : (1) Reflux of blood through the Fallopian tubes, due to spasmodic contraction of the uterus, or of the tubes, set up by sudden evacuation ; (2) Rupture of some adherent portion of the Fallopian tubes during the collapse of the tumor ; (3) Decomposition of some of the retained fluid, which may lead to septic peritonitis, inflammation of the walls of the cavity, or, in some cases, rupture of these walls ; (4) The walls of the cavity are also liable to become inflamed, even when no obvious decomposition has occurred. This is probably to be explained on the ground that, the cavity having been congenitally shut off from the outer surface, its walls have a susceptibility, like that of serous membranes, to the influence of germs commonly or occasionally present in the air.

When the accumulation of fluid is very considerable the danger appears to be best avoided by removing small quantities at a time by means of the aspirator, or a very fine trocar, which may be used under carbolic spray. The process should be commenced at the period of quiescence, shortly after a

menstrual epoch, and the patient meanwhile kept perfectly at rest. If any considerable length of the vagina is affected by the atresia, the puncture may be made through the rectum. This method does not, however, invariably prevent the kindling of inflammation or septic change, antiseptic dressings being difficult to maintain at the vulva. If, therefore, there is any evidence of decomposition, or serious constitutional symptoms arise, a free opening should at once be made, and either immediately, or after a short interval, the cavity should be freely washed out with antiseptic fluid, especially a solution of sulphurous acid,* or a weak solution of iodine,† and such injections should be continued at frequent intervals. Full doses of quinine, or other internal antiseptic, with opium, should also be given. If much distension still exists at the time of operation, it appears better to allow some hours for spontaneous gradual evacuation of the fluid before the cavity is washed out, to lessen the risk of exciting violent contraction. If, however, the fluid be decomposed, injection should not be deferred.

When the collection of fluid is comparatively small a free opening may be made at once. Experience has not yet fully decided whether it is better or not to wash out the cavity immediately. It appears preferable, however, as in the former case, to wait twelve or twenty-four hours for gradual evacuation before injecting, unless any sign of decomposition or febrile symptoms have previously appeared. Dr. Emmet, however, prefers the plan of immediately washing out the cavity, whether large or small, and has obtained by this means a favorable result in a considerable number of cases. He is also opposed to puncturing *per rectum* under any circumstances.

When the whole or a considerable part of the vagina is absent, it is preferable, if possible, to make the permanent passage in the natural situation, rather than through the

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* Acidi Sulphurosi, ℥j ad Aq. Oj.   † Tinct. Iodi, ℨij ad Aq. Oj.

rectum; and the making of an artificial vagina may be
undertaken when any uterus can be detected, even though
there is no collection of menstrual fluid. When, however,
as is often the case, the septum is very thin between rectum
and bladder, great care is required to avoid opening one of
these cavities. The patient should be placed in the lithot-
omy position, and the knife or scissors used only to make
a transverse incision through the mucous membrane, just
in front of the fourchette. The rest of the passage should
be torn by the index finger of the right hand, while the left
index finger is kept in the rectum, and a sound is held by
an assistant in the bladder. The operator is thus guided
by the sense of touch in making a passage equidistant
from either cavity. If necessary, for enlargement of the
canal, the finger may be removed from the rectum, and
used to assist the other in the artificial passage, or a blunt
instrument, such as the raspatory employed for scraping
bones, may be used in conjunction with the finger. The
uterus, when reached, may be pierced either by a trocar or
knife if there is no patent os externum. The artificial va-
gina should be made at first larger than required. A full-
sized Sims's dilator of glass (Fig. 63) should be introduced
at once, and must generally be worn continuously for a good
many months to avoid the strong tendency to contraction
which exists. This serves to check hæmorrhage in the first
instance, and, under its unirritating pressure, an epithelium,
like that of mucous membrane, may gradually spread over
the artificial vagina. Eventually, it may be possible to
substitute for the dilator a narrow Hodge's pessary. Mar-
riage, if not already contracted, should not be advised un-
til the patency of the new vagina has been tested for a con-
siderable period. Should the attempt to make an artificial
vagina fail, the only alternative, if menstrual fluid is poured
out, is to endeavor to keep open a passage *per rectum*, and
many operators have adopted this measure from choice in

the first instance. The treatment of acquired atresia is similar to that of congenital, but the risk of evacuating retained fluid appears, in this instance, to be considerably less.

STENOSIS OF THE OS EXTERNUM.

Causation and Pathological Anatomy.—Congenital stenosis of the cervical canal is situated either at the external or internal os, and extreme stenosis is not uncommon at the former orifice, while it is rare at the latter. The intervening cervical canal is comparatively free, being somewhat spindle-shaped. A small external os is usually associated with a tapering, conical cervix, projecting more than usual into the vagina. Frequently also the cervix is flexed forward, so that the os looks in the direction of the vagina, or even still more anteriorly (Fig. 13 and Fig. 36), the posterior lip of the cervix being long, and the anterior lip short.

Section showing Conical Cervix with small Os Externum.—(After Barnes.)

More rarely the cervix is flexed backward. In many cases this form of cervix is associated with imperfect development of the whole uterus, or of the uterus and ovaries. The uterine cavity is then rather less than the normal length, and menstruation scanty. From some associated imperfection, sterility often persists after the stenosis has been cured. The vagina may partake in the same imperfect development, and be smaller than usual, and sexual feeling

is often deficient. Dr. G. Roper has adduced a case to show that an infantile form of pelvis may also be an associated condition. Acquired stenosis may arise from gradual contraction of the os externum in old age, or after the use of caustics. It is also common in old cases of prolapse of the third degree (see pp. 113, 115).

Results and Symptoms.—The most marked results of stenosis of any part of the cervical canal are dysmenorrhœa and sterility. Dysmenorrhœa is, however, not invariable. If the menstrual flow is moderate and uniform, and the mucous membrane thrown off is completely disintegrated, no obstruction or pain may result; but if the flow is more profuse, or if there are any clots or shreds of menstrual decidua (see p. 42) to pass, spasmodic pain is produced by the efforts of the uterus to overcome the difficulty. The extent both of the spasmodic contraction and of its painfulness depends in very great degree upon the irritability of the woman's nervous system and her sensibility to pain. Sterility is a more constant symptom than dysmenorrhœa; nevertheless it does not imply an absolute hindrance, but only an increased difficulty in the access of spermatozoa to the uterus (see section on Sterility). I have met with several instances of women whose os externum would not admit the smallest surgical probe, but who had never suffered the slightest dysmenorrhœa, although they were sterile. More frequently, in addition to dysmenorrhœa, endometritis is produced by irritation, due to the retention of menstrual and other secretions; and this may lead to hyperæmia and menorrhagia, although the primary condition is usually that of scanty menstruation. The uterus then becomes hypertrophied, partly from the effect of hyperæmia, partly from the muscular efforts to overcome obstruction. The Fallopian tubes may also become dilated, and reflux of menstrual fluid take place, leading to pelvic peritonitis or hæmatocele.

Treatment.—The os externum may be dilated by means of tents or instrumental dilators, but it is then apt to become contracted again ; and this mode of treatment is not superior in safety or convenience to the method of incision.

Incision is most conveniently performed by Kuchenmeister's scissors (Fig. 14), the blade of which has a point projecting at right angles, to prevent retraction of the portion of cervix seized. The incisions should not be made completely up to the vaginal junction, especially if bilateral, otherwise ectropion of the cervix and its resulting evils may be produced. The incisions may also be made by any of the single or double-bladed metrotomes, of which the most widely useful is the original metrotome of Simpson (Fig. 15). This is a bistouri caché, the amount of projection of the blade of which is regulated by a screw in the handle. In the use of this, however, the cervix is apt to stretch to a degree not easily calculated, and it is usually de-

FIG. 14.

Kuchenmeister's Scissors.

sirable to complete by the scissors the division of the external part of the cervix to the exact extent desired. The scissors, however, when used first, always leave a somewhat projecting tongue of tissue, retraction not being entirely prevented ; and I have found it advantageous after their use to cut away this tongue by an incision with the metro-

tome sloping gradually outward from about the centre of
the cervical canal (Fig. 16, c a).

Fig. 15.

Simpson's Metrotome.

The operation does not require an
anæsthetic unless the patient be ner-
vous, as the pain is very brief. Care
should be taken that fingers and in-
struments are free from any possible
septic contamination. The incisions
may be made by the sense of touch
alone, without using any speculum,
but Sims's speculum may be used if
preferred. If the stenosis be com-
bined with cervical anteflexion it is
best to make a single incision back-
wards nearly up to the cervical junc-
tion, so as to throw the new aperture
more nearly into a line with the upper
part of the cervical canal (see Fig.
18). The converse operation may be
performed if the os looks too much
backward. If, however, the uterine
axis is nearly straight, the incision
should be bilateral and less extensive.
If the metrotome is used to complete
or commence the incision it should be
set to cut pretty widely, its extremity
passed up a little short of the internal
os, and it should then be gradually
opened as it is withdrawn, so as to cut
in the line c a (Fig. 16). A little
cotton-wool dipped in perchloride or
subsulphate of iron should be placed
in the incision, by aid of the speculum,
for the double purpose of checking
hæmorrhage and preventing primary union. A larger

tampon soaked in carbolized or iodized glycerin should be placed in the vagina. For a few days perfect rest should be maintained, antiseptic vaginal injections used, and occasional digital examinations made, to prevent adhesion taking place. After that time there is little tendency to close at the external os, if the incision at first is sufficiently free.
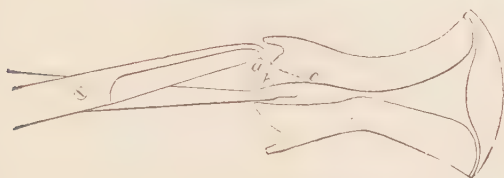
Kuchenmeister's Scissors cutting Cervix,
a b, line of incision by scissors; *a c*, line of incision by metrotome.

If the stenosis is so extreme that the metrotome will not pass, or the probe-pointed blade of the scissors cannot at first be introduced far enough to make an adequate incision, it is convenient first to expand the os partially by Priestley's dilating sound (Fig. 19). In extreme cases it may be necessary to commence the dilatation by a sharp-pointed probe, or pointed bistoury. If the stenosis be slight, and unaccompanied by cervical flexion, the occasional use of Priestley's dilating sound or graduated bougies may be sufficient.

The method of Marion Sims is to use his own speculum and a special knife, consisting of a small razor-shaped blade, which can be fixed at any angle at the end of a long handle (Fig. 17). The scissors are first used, and the uterus is then firmly held by a tenaculum hook, while the incision is made by the knife from below upwards, in a slanting line as far as the internal os, as shown in Fig. 18. In the case of

anteflexion of the cervix the incision is to be directly back-ward, otherwise it is to be bilateral.

Fig. 17.

STENOSIS OF THE OS INTERNUM.

Causation and Pathological Anatomy. — Opinions have differed widely as to the relative frequency of stenosis of the os internum, and some high authorities, as Barnes and Schrœder, have considered it so rare as seldom or never to require any operative interference. The ma-jority, however, hold that a relative stenosis at least is not uncommon, and this is the result of my own experience. From autopsies made in a considerable number of nulliparous women, Dr. Peaslee has concluded that the average size of the internal os in them is equivalent to a circle $\frac{1}{7}$ inch in diameter, a size which will allow the ordinary sound, whose extremity should be about $\frac{1}{8}$ inch in diameter, to pass pretty easily. In parous* women, who were neither sterile nor suffered from dysmenorrhœa, he found the aver-age area to be nearly double that in nulliparous women, in the majority of cases admitting a sound $\frac{1}{5}$ inch in diameter, though, in a large minority, one from $\frac{1}{7}$ inch to $\frac{1}{8}$ inch only could be passed. Hence, an internal os which, apart from flexion or spasm, will not readily admit an ordinary sound, not too large at the point, is abnormally small. Moreover, it is well known that parous women habitually menstruate more easily than virgins, or the nulliparous, and that after a first pregnancy, if no morbid sequelæ re-main, the probability of a further pregnancy is increased.

Sims's Uter-ine Knife.

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* The word parous is used on the analogy of multiparous and nulliparous to denote one who has borne one or more children.

It may be inferred that menstruation and conception may be facilitated by dilating the cervix to the average size of that in parous women. As regards dysmenorrhœa, this

FIG. 18.
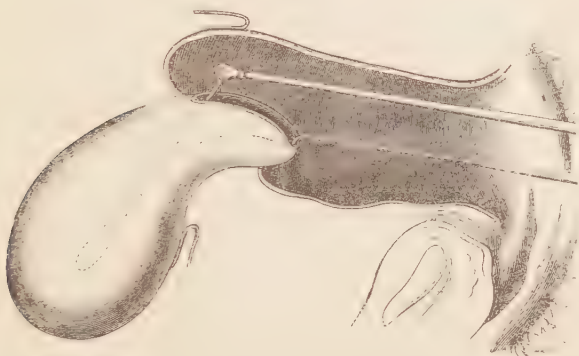
Posterior Section of the Cervix by Sims's Knife.—(After Sims.)

treatment is especially indicated if the case is complicated by any flexion, by menorrhagia leading to the formation of clots, by the discharge of shreds of membrane, by excessive hyperæmia leading to tumefaction of the cervical mucous membrane at menstrual periods, or by an irritable condition of the nervous system, owing to which a slight cause of obstruction sets up spasmodic and excessively painful uterine contractions.

Acquired Stenosis may affect the internal os or other parts of the cervical canal. It may result from cicatricial contraction after the use of caustics or other operative interference, from endometritis with hyperplasia of the cervix, or from injuries received in parturition.

The **results** and **symptoms** of stenosis of the internal os resemble those of stenosis of the external os, as already enumerated, and are often combined with the effects of anteflexion.

Diagnosis.—The arrest of the sound near the internal os is much more frequently due to flexion than to stenosis. Stenosis can only be inferred when a full-sized sound is arrested, but a smaller sound having the same curve will pass. For this purpose a sound not more than $\frac{1}{15}$ inch or $\frac{1}{12}$ inch in diameter (equivalent to No. 2 or No. 1 bougie) may be required. It is rare for the internal os to be too small to admit a sound of $\frac{1}{15}$ inch in diameter, though flexion may render it very difficult to pass it. Temporary stenosis, due to spasmodic contraction of the internal os, is distinguished by its yielding after awhile to very gentle pressure. A tendency to such spasm is often associated with some primary narrowness. For diagnosis of a degree of smallness which cannot be called in itself morbid in a nullipara, but yet may amount to a relative stenosis, under the circumstances already mentioned, larger sounds are required. A convenient instrument for diagnosis, as well as for the purpose of effecting or maintaining dilatation, is a conical sound $\frac{1}{5}$ inch in diameter at the point, and enlarging to $\frac{1}{3}$ inch at the position corresponding to the internal os. If this can be passed with ease, the absence of any, even relative, stenosis is assured, and if it is arrested the point of arrest will afford an estimate of the size of the internal os, provided that it is ascertained by the finger that the arrest is not due to the external os.

Treatment.—The choice between tents, incisions, or instrumental dilators is more difficult in the case of the internal than that of the external os. Incision is much more likely to be followed by adhesion and contraction than in the other case, but contraction is also likely to occur after dilatation. Nevertheless the greater average size of the internal os in parous women shows that after full dilatation it does not usually so completely close again, and I therefore think it preferable first to make trial of dilatation. If symptoms of stenosis repeatedly recur after temporary improve-

ment, or if the cervical canal is cicatricial in acquired stenosis, incisions should be used. Perhaps the safest mode of dilatation is to pass from time to time graduated metallic bougies, slightly conical, until the cervical canal is considerably larger than the required size, and will admit a No. 11 or No. 12 bougie. In the case of virgins this method has the drawback that, to be effectual, it requires frequent manipulation. Dilatation by a laminaria tent avoids this difficulty, and, when flexion is superadded, it is advantageous from its effect of softening the walls of the uterus, and straightening it for the time being. It must be used with due precaution (see p. 37). A convenient mode of rather rapid dilatation is the use of Priestley's dilating sound (Fig. 19), formed of two blades joined at the extremity, and expanded by a screw at the handle, so that the external os is stretched to a considerable, the internal os to a moderate, size, in proportion to the natural relative dimensions of the two orifices. The point should not be more than $\frac{1}{10}$ inch in diameter, and the blades should be capable of separation to a width of $\frac{1}{4}$ inch at the position of the internal os. The instrument should be used cautiously, and only partially expanded at first, with the view of gradually stretching the muscular fibres rather than causing any rupture. If the screw works easily, the degree of resistance in the cervix is readily estimated by the finger, and thus diagnosis as well as treatment is assisted.

FIG. 19.

Priestley's Dilating Sound.

Other forms of mechanical dilators have been invented by Ellinger and others, in which the blades, two or three in number, are free at the extremity and are separated by closing the handles. It has been recommended to effect imme-

diate full dilatation by means of such an instrument with
the aid of an anæsthetic. There is some risk, however, of

FIG. 20.

exercising a dangerous degree of stretching
upon the internal os or cavity of the uterus,
and it is difficult to estimate exactly the ex-
pansion actually produced, on account of the
elasticity of the blades.

Incision may be performed by Simpson's sin-
gle-bladed (Fig. 15), or by any of the numer-
ous two-bladed, metrotomes, introduced without
any speculum. Much caution, however, is re-
quired in incising the internal os, since the large
vessels which enter the uterus at this level are
not far off, and alarming and even fatal hæm-
orrhage has sometimes occurred. Dr. Green-
halgh's metrotome (Fig. 20) contains an ingeni-
ous mechanism by which two blades cut out-
wards and downwards in a definite curve, and
an adjustment for regulating the width of the
incision. The incision, however, so produced,
even at its smallest, is dangerously wide at the
internal os, when the instrument is fully intro-
duced, and it is preferable only to expand the
blades to a slight degree, and then cut by with-
drawing the whole instrument. A simpler me-
trotome for use in this manner is that of Dr.
Savage, in which each blade forms the shield
for the other. Two-bladed metrotomes are lia-
ble to cut the two sides unequally from asym-
metry of the uterus or from a difference of
sharpness in the blades. With Simpson's me-
trotome the depth of the second incision is also
uncertain, owing to the want of firm resistance
to the back of the instrument. A graver ob-

Greenhalgh's
Metrotome.

jection to both forms of instrument is that, as usually made,

they are so large that, when incision of the internal os is
required, they cannot be introduced with-
out preliminary dilatation by a tent, after
which it is difficult to judge exactly how
much the canal will contract again, and
therefore how deep an incision is required.

FIG. 21.

A safe and convenient instrument, though
little known in Britain, is Dr. Peaslee's
metrotome (Fig. 21). This consists of a
flattened tube, narrowed for its terminal two
inches, in which slides a single blade, lancet-
shaped toward the point, but blunted at its
extremity. There are two blades for each
instrument, the cutting portion of one being
$\frac{1}{4}$ inch, of the other $\frac{3}{16}$ inch wide. A nut
and screw on the handle of the blade regu-
lates the extent of its passage into the
uterus. The narrower blade is generally
sufficient for incision of the internal os. I
have used a modified form of this instru-
ment, in which the tube is made round in-
stead of flat, and its terminal portion of
smaller size, being only $\frac{1}{12}$ inch in diame-
ter near the extremity. It can then be
passed through a very narrow cervical canal,
being introduced like the ordinary sound.
If the uterus be much flexed, it should first
be straightened by means of a small sound,
in the manner described under the head of
Flexions of the Uterus (p. 103).

After incision, it is desirable to swab the
cervical canal with solution of perchloride
or subsulphate of iron, to prevent primary
union, and it is also necessary to main-
tain in some way its patency. The imme-
diate introduction of an intrauterine stem,

Peaslee's Metro-
tome.

as recommended by Barnes and Marion Sims, is not without risk, and it is preferable to pass occasionally a large conical sound. If used immediately at all, the stem should be a simple one of glass. After an interval of a week or two a stem may be introduced if necessary, as being the most effectual mode of maintaining patency, and worn for some weeks or months. An expanding stem (see p. 107) is convenient from its self-retaining quality.

When stenosis of the external os exists, the internal os is not unfrequently also smaller than normal. It is preferable, however, not to incise both at a single operation, since the more limited incision may prove sufficient, and the subsequent dilatation necessary to keep the inner os patent is unnecessary and undesirable after incision of the external os and cervical canal.

CHAPTER IV.

DISPLACEMENTS OF THE UTERUS AND PELVIC VISCERA.

DISPLACEMENTS of the uterus may be either the cause
or the consequence of chronic hyperæmia, inflammation, or
hyperplasia, and much controversy has taken place on the
question as to which is the usual sequence of events. Its
most important bearing is the inference to be deduced from
it as to treatment when the two conditions are found com-
bined. There is no doubt that even when a displacement
is in the first instance secondary to hyperæmia or inflamma-
tion, it has often a strong tendency to keep up and intensify
the condition which gave rise to it; hence the general prin-
ciple of action is that if the displacement is important in
its degree and effects, and can be cured or alleviated by a
pessary which is readily tolerated, it is best to have recourse
to early mechanical treatment, in addition to other meas-
ures. This is usually the case in displacements of the uterus
backward or downward. If, however, the displacement be
but a slight departure from the normal condition, and if it
can only be remedied by a pessary which is itself liable to
cause irritation, hyperæmia or inflammation, if present,
should first be relieved as far as possible by general meas-
ures, and a pessary only tried when other treatment has
proved insufficient to relieve symptoms. This is more fre-
quently the case in anterior displacements of the uterus,
and the principle applies above all to the use of intra-
uterine stems.

There are some cases, although exceptional ones, in which

even an acute flexion of the uterus is accidentally discovered, and in which no symptoms exist, just as there are some instances of extreme stenosis without any dysmenorrhœa. These are chiefly cases in which the flexion is primary, and has never become complicated by hyperæmia or inflammation, or in which, after the menopause, all such complications have long subsided. When symptoms are absent, treatment is of course unnecessary; but it must be remembered that the only symptom may be that of sterility, or that those which chiefly attract attention may be distant reflex symptoms, such as disturbances of digestion or hysterical manifestations. There is another class of cases in which mechanical treatment is, as a rule, forbidden, namely, that in which the displacement is secondary to inflammatory adhesions or deposits, by which the uterus is firmly fixed. Palliative treatment only is here admissible, for any attempt at immediate replacement is dangerous, and a pessary generally fails to remedy the displacement, while it excites irritation by pressure.

NORMAL POSITION OF THE UTERUS.—The uterus in a healthy and unimpregnated state is a very mobile organ, the whole of its body being free from any attachment except a very lax one by means of the broad and round ligaments, a provision necessary to allow of its expansion during pregnancy. The axis of the normal uterus varies from a straight line to a curve whose concavity looks forward, and whose angle does not exceed 20°. The maintenance of this axis during the movements of the uterus depends solely upon the firmness of the uterine tissue itself. The chief supports of the uterus are its attachment anteriorly to the bladder, and, by its means, intermediately to the pubes, and posteriorly the utero-sacral ligaments. By these attachments its centre is rendered comparatively a fixed point, while the broad ligaments place scarcely any restraint upon backward or forward displacements of the uterine body, and

only partially limit lateral displacements. The round ligaments have a certain function in drawing the fundus forward after displacement by distension of the bladder or

Fig. 22.
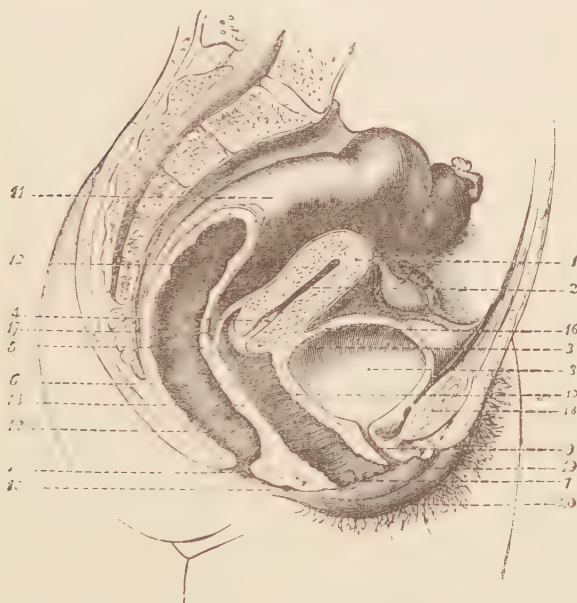
Longitudinal Section of the Pelvic Organs.—(After Sappey.)

1, body of uterus; 2, its cavity; 3, the vaginal portion; 4, canal of cervix; 5, os uteri externum; 6, the vagina; 7, orifice of vulva; 8, interior of bladder; 9, urethra; 10, vesico-vaginal septum; 11, rectum; 12, its cavity; 13, anus; 14, recto-vaginal septum; 15, perinæum; 16, vesico-uterine fossa of peritoneum; 17, recto-vaginal or Douglas's fossa of peritoneum; 18, os pubis; 19, labium minus; 20, labium majus.

otherwise, but are usually not on a stretch, and have little efficacy in preventing displacements. The mean direction of the axis of the uterus is generally regarded as being coincident with that of the pelvic brim. It varies, how-

ever, considerably under different circumstances, and in different positions of the body, being inclined more anteriorly in the erect position, when the bladder is empty, and more posteriorly when the bladder is full, especially when the rectum is at the same time empty. Besides these movements upon a transverse axis passing nearly through its centre, the uterus as a whole is capable of a certain amount of upward and downward movement, in which movement the base of the bladder necessarily partakes.

The pressure of the intestines has an important influence in maintaining or modifying the position of the uterus. Being made up of that of the individual coils, it is not equable on all sides, like a fluid pressure, but is apt to be greatest where the coils are largest or most numerous. This is usually the case in the retro-uterine fossa of the peritoneum, which is more capacious than the space in front of the fundus, and hence the intestinal pressure is an important element in maintaining the normal slight anteversion of the uterus, the bladder being empty, in reference to the axis of the brim. When in a healthy state the vagina, as a cylindrical muscular column, has also an influence in supporting the uterus, but when it has become excessively relaxed this function is lost, especially when by more or less complete laceration of the perineal body (Fig. 22, [14] [15]) in parturition, the cylinder has lost its base of support. The vagina then frequently becomes an active agent in producing prolapse.

Causation of Displacements in General.—Displacement of the uterus may be produced by any influence which tends to increase the weight of the organ, to weaken its supports, to push or to drag it out of place, or to diminish the firmness of the uterine tissue itself, the last element coming into play specially in the causation of flexion. Increased weight is most commonly due to the presence of fibroid or other tumors, to subinvolution or hyperplasia of

the whole or a part of the uterus, to hyperæmia, or to pregnancy. Causes tending to weaken the uterine supports may be a general want of nutrition and laxity of tissue, associated with feeble health, especially if combined with a deficiency of fat. The most important, however, are the effects of pregnancy and parturition, including not only a stretching and loss of tone of all the uterine ligaments and of the vagina, but frequently also more or less damage to the perineal body. These are conjoined with excessive weight of the uterus so long as involution of that organ remains incomplete; and thus a too early getting up, or undue exertion too soon after delivery, is the commonest of all causes of serious displacement. Among external causes are the effects of muscular efforts or fall, which may produce sudden displacement of an organ previously healthy. This, however, is comparatively rare, while a gradual effect, produced by prolonged muscular exertion in the standing position (as in the case of laundresses), or by repeated efforts of any kind, as chronic cough or straining in habitual constipation, is much more common. Excessive intra-abdominal pressure is also produced by tight lacing, or the suspending of heavy skirts from the waist. Among the most irresistible forces tending to displacement are those exerted by tumors, effusions of fluid, or inflammatory deposits which push the uterus, or contracting adhesions which pull it from its place.

Undue softness of uterine tissue is an important cause of flexions. It may result simply from imperfect nutrition, a condition most common in girls about the age of puberty as the effect of insufficient or unsuitable diet, or imperfect digestion, especially when associated with a too sedentary life, and lack of sufficient air and exercise. In the earlier stage of uterine hyperæmia or chronic metritis, the uterus is soft as well as increased in bulk, and therefore prone to flexion, while in the later stage it becomes indurated. According

to Dr. Thomas, one of the most frequent causes of flexion is endometritis of the cervix leading to hyperplasia of connective tissue, with concomitant atrophy of the muscular structures. Softness of the uterus also exists after parturition, and any cause which interferes with involution also prolongs the softened state of the organ.

RETROVERSION AND RETROFLEXION OF THE UTERUS.

Pathological Anatomy.—In retroversion the shape of the uterine axis is unaltered, but the whole organ is tilted backward, so that the fundus is inclined toward the sacrum and
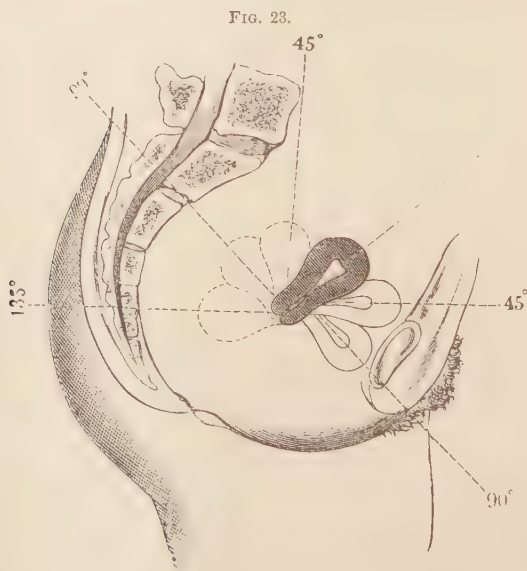
Fig. 23.

The Degrees of Retroversion and Anteversion.—(After Thomas.)

the os toward the pubes. Retroversion is possible through a very large angle, and is not unfrequently up to one of about 135° (Fig. 23). In the case of the gravid uterus, at

the third or fourth month even this may be exceeded, and the angle of retroversion almost reach 180°, so that the fundus presses down upon the perinæum, bringing down with it the retro-uterine pouch of peritoneum, and distending the recto-vaginal septum.

Fig. 24.

Retroflexion of the Uterus.

In retroflexion the axis of the uterus is bent upon itself, so as to create a curve with its concavity looking backward. The curve is generally not uniform, but has a point of maximum curvature usually near the internal os. In pure retroflexion the direction of the os uteri may be unaltered, but more frequently retroflexion is combined with more or less of retroversion, so that the axis of the uterus is carried backwards, while at the same time the os is tilted forwards (Fig. 24). In primary retroflexion, on the other hand, the

os may look too much backwards, as in anteversion. In a recent flexion of the uterus, whether backwards or forwards, the uterine wall on the outside of the curve becomes the thinner as the result of stretching, exactly as would be the case with an india-rubber tube. In pathological specimens from old cases of flexion, however, it is often found that it is the wall on the concave side which is attenuated. This may be the result of atrophy from the prolonged effect of pressure and interference with the circulation, or may depend upon the flexion having been in the first instance due to a failure of development in the anterior or posterior wall of the uterus. The occasional existence of such a condition explains the great difficulty sometimes found in preventing the return of the uterus to its former shape after it has been straightened.

Retroversion and Retroflexion of the Gravid Uterus will not be discussed here, since they are considered in works on midwifery.

Causation. — The predisposing causes are the same as those enumerated for displacements in general. Retroversion is especially associated with prolapse, since the uterus as it descends tends to follow the curved axis of the pelvis, the cervix moving downward in the line of the vagina, the direction of least resistance (Fig. 40). The causes of prolapse, therefore, almost invariably produce at the same time more or less retroversion. Retroversion may also be brought about by the effect of gravity if the dorsal or dorsal reclining position (as in an easy chair) be too persistently maintained, especially when the uterus is heavy, as after parturition. Such an effect may be increased by overtight bandaging. A similar effect may result from the prolonged and excessive distension of the bladder to which women are especially liable, a temporary and partial retroversion being a necessary result of this distension. If a muscular effort is made under these conditions the retroversion may be suddenly increased.

Retroflexion is, in rare cases, a primary affection, being due to defective development of the posterior uterine wall, either in fetal life or at the time of puberty, when the organ is the subject of rapid growth. In the great majority of cases, however, it is secondary, and it is generally developed out of a partial retroversion. This may be partly the effect of gravity and partly that of the intra-abdominal pressure acting either gradually or during muscular efforts. When retroversion exceeds an angle of about 55° the weight of the body of the uterus itself, in the standing position, begins to tend to increase the retroversion or convert it into a retroflexion, instead of tending to bring the fundus forward as in the normal condition (compare Figs. 23, 40, with Fig. 22). In the sitting or reclining position this effect comes into play at a less angle than 55°, the pelvic inclination being then much diminished. Again, when partial retroversion exists, there is more room for coils of intestine in front of the fundus than behind it, and thus the intestinal pressure, which normally should keep the fundus forward (see p. 70), comes to act upon its anterior surface, and press it down into the hollow of the sacrum. Thus is brought about, if the uterus is rigid enough, an increased retroversion; but, if it is soft, the retroversion is converted into retroflexion. Retroflexion may also be produced by the weight of a small fibroid tumor in the posterior uterine wall.

Results and Symptoms.—Versions of the uterus, unless of extreme degree, produce comparatively little effect upon the uterus itself, the symptoms being chiefly those due to dragging of ligaments or pressure on neighboring structures, and those which belong to associated hyperæmia or inflammation. A flexion, however, has a double effect upon the uterus. First, the veins are compressed by the bending of the organ at the level where the vessels enter it; and, secondly, the exit of the menstrual and other secretions is hindered.

From the first cause arises passive hyperæmia, menorrhagia, or metrorrhagia, and vulnerability to slight exciting causes of inflammation; from the second, hypertropy of muscular tissue to overcome the obstruction, and all the effects which have been enumerated as due to an obstructed canal, such as dysmenorrhœa, sterility, peritonitis from reflux of menstrual blood, and especially endometritis from the irritation of retained secretions. The passive hyperæmia is far greater in retroflexion than in anteflexion, since the enlarged fundus, pressed down into the hollow of the sacrum, rests upon, and is compressed by, the utero-sacral ligaments at either side. Menorrhagia, or metrorrhagia, is therefore a much more prominent symptom of retroflexion than of anteflexion, while sterility is not so general, the displacement more commonly occurring in parous women, so that there is no stenosis of the cervix to add to the effect of flexion. Repeated abortion at the third or fourth month is, however, a frequent result, the uterus being unable to rise out of the pelvis. Adhesions are occasionally produced by a partial peritonitis, and the fundus then becomes tethered in a backward direction.

Many of the other symptoms of retroversion and retroflexion are common to most uterine maladies, being due to associated hyperæmia, endometritis, or metritis. Among such are pains extending down the thighs, digestive disturbances, hysterical manifestations, or functional paralysis. The most marked form of pain, however, in retroversion, and still more in retroflexion, is pain over the sacrum, increased in defecation. The pain in defecation is due to pressure on the tender fundus, which, when the displacement is considerable, encroaches on the calibre of the rectum (Fig. 24). It is often associated with rectal tenesmus and excessive secretion of slimy mucus from the rectal mucous membrane. Frequently, also, there is obstinate constipation, partly due to the degree of mechanical obstruction

existing, partly to the pain in defecation. In both forms of displacement coitus becomes a mechanical cause of inflammation, especially in retroversion of about 90°, when the cervix lies almost directly in the line of the vagina, and is usually, also, too low down (Figs. 23, 40). The bladder is affected less in retroflexion than in retroversion, when the pressure of the cervix may cause irritability, or, when the uterus is enlarged by tumor or by early pregnancy, may lead to retention of urine, which is the most characteristic symptom of retroversion of the gravid uterus.

Diagnosis.—In retroversion the os is found on vaginal touch to be tilted forwards, often so much so as to look in the direction of the vagina or still more anteriorly. By bimanual examination the absence of the fundus from its normal position is ascertained, the external hand coming close down upon the finger in the vagina. More or less of the body of the uterus is felt by the finger behind the os, but without any concavity or angle between it and the cervix. It may be made to move in conjunction with the cervix, unless fixed by adhesions, and, if necessary, the diagnosis may be confirmed by the sound, introduced with its concavity looking backwards.

In retroflexion the os may look in the normal direction, or even too much backward, but is more frequently more or less tilted forward. The fundus is absent from its normal situation, and is felt behind the os as a rounded tumor, with a concavity between it and the cervix. If rigidity of muscles, distension of the abdomen, or the presence of inflammatory or other swellings makes it impossible to ascertain the presence or absence of the fundus in front on bimanual examination, the diagnosis becomes more difficult. It may often be effected with the finger alone, by tracing the continuity between fundus and cervix, and their joint mobility, but the sound here affords decisive information. Its use, however, should be avoided, as a rule, if active in-

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flammation be present. If the os looks in a normal direc-
tion, the sound, which has been previously bent to a curve
nearly as great as that which the uterine axis is supposed
to have, is introduced with its concavity at first forward,
and when it has reached the internal os is reversed by a
tour de maitre, the converse of that previously described
(see p. 20, and Fig. 28). It is then passed on to the fundus
by carrying the handle far forward if necessary, and at the
same time pushing up the fundus by the finger in the vagina.
If the os is tilted forward, however, the concavity of the
sound should be directed backward from the first. If the
fundus be restored by the sound in the mode described
under the heading of Treatment, the swelling will disappear
from behind the fundus. The most difficult cases for diag-
nosis are those in which the fundus is involved in, or adhe-
rent to, fibroid or other tumors or inflammatory swellings,
and in such case the sound alone can usually afford certain
results. A small fibroid in the posterior uterine wall is apt
to be very misleading, especially since it generally produces
more or less retroflexion. The diagnosis must then be made
by completely restoring the uterus with the sound, and then
observing whether the swelling previously felt behind the
cervix has entirely disappeared.

Treatment.—In the majority of cases of retroversion or
retroflexion of any notable extent, excepting those in which
the displacement is secondary to periuterine inflammation,
it is desirable to commence the treatment by replacing the
uterus, and maintaining it, as far as possible, in position,
after which remedies for the relief of any coincident hyper-
æmia or inflammation are likely to be much more effectual.
This depends upon the fact that the displacement can gener-
ally be rectified in a more or less complete manner by some
form of Hodge's pessary (Fig. 25), which can usually be
tolerated even when the uterus is tender. The mechanical
action of this pessary, which is sometimes termed the lever

pessary, is twofold. In the first place, its posterior limb stretches the posterior vaginal cul-de-sac backwards and upwards (Fig. 26), and thereby draws the cervix backward, and tilts the fundus forward. The uterus itself may here be regarded as a lever, the fulcrum being at its centre, and the power applied to the cervix. The mechanism therefore tends to remedy retroversion, but has no direct effect upon retroflexion. The second action is that by which the posterior limb, when sufficiently long and curved upwards, directly pushes up the displaced fundus, or, more frequently, prevents its return when it has been restored by other means (see dotted outline in Fig. 26). The pessary is here the lever; the fulcrum is a transverse axis, nearly through its centre, upon which it is capable of oscillating as it is grasped by the vaginal walls; the power is the pressure of the anterior vaginal wall upon its anterior limb, greatly increased during any expulsive efforts; the weight, or resistance, is the fundus uteri, which is pushed up by the posterior limb. Some authorities have denied the latter action, and have maintained that the pessary is useful only in retroversion and not in retroflexion. If this were the case, a rather flat pessary would be the best, as most efficacious in drawing the cervix backward. Experience, however, shows that a pessary with a long and strongly-marked sacral curve often succeeds in retroflexion when a flatter one has failed.

It is impossible, however, for the pessary directly to push up a retroflexed uterus completely into its normal position, and, when it is acting in the most successful manner, the fundus will be found no longer in contact with the posterior limb of the pessary (Fig. 26). This depends upon two causes: First, that the fundus can be pushed up to such an extent that the weight of the uterus itself, in the standing position, will tend to remedy instead of to aggravate the displacement (see dotted outline in Fig. 26); secondly, that, when the coils of intestine have once been allowed to come
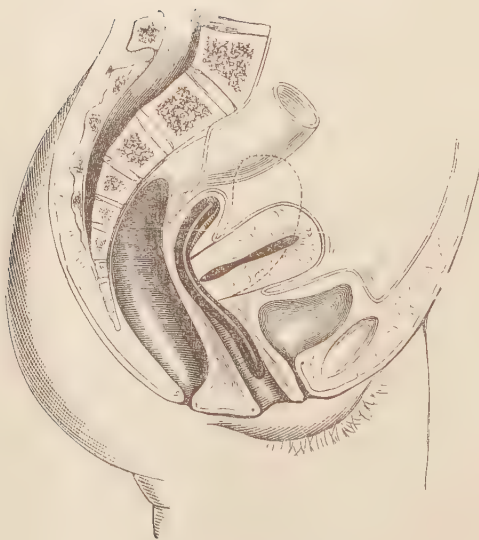
down into the retro-uterine fossa of the peritoneum, they resume their normal function of pressing chiefly upon the

Fig. 25.

Hodge's Pessary.

Fig. 26.

Hodge's Pessary in Position.

posterior surface of the uterus, and so tend gradually to reduce any retroflexion. Short of this result, however, the

pessary may do good by directly supporting the fundus, especially in cases of fibroid in the posterior uterine wall.

Hodge's pessary has been made in many different shapes, and various names have been applied to these. That most generally useful is shown in Figs. 25 and 26. The upper or sacral curve is considerable, the lower or pubic curve is slight, and only just sufficient to distribute the pressure equally over the anterior vaginal wall. The lower extremity is square in the centre, but well rounded at the corners. The whole instrument should be made thick, the bar being nearly $\frac{3}{10}$ inch in diameter, that its pressure may be more easily borne. There is then no risk of ulceration being produced, even if the pessary is neglected, provided that the fit is suitable originally. When in place it should not rest against the pubic rami, or any bony support, but be held by the elastic vaginal walls.

It will be convenient here to speak of the materials used in the construction of pessaries in general. The best of all is vulcanite, since it is light, smooth, and non-absorbent, and can readily be bent to any shape. The bending may be affected by placing it in hot water, not far short of the boiling-point, and afterwards plunging it in cold water, after the desired shape has been given. Another method is to oil the surface, and then to move the instrument rapidly backward and forward through the flame of a spirit-lamp, till it is sufficiently softened. The latter mode is more convenient for bending one part of a pessary at a time, but a little practice is required to avoid burning the surface, and so spoiling its polish. Hodge's pessaries are also made of pewter tubing, which can be bent by the hand. These answer very well, but they are rather heavier than vulcanite, are apt to separate at the point where the tubing is joined, and are not quite so perfect in cleanliness. Pessaries may be made hollow in platinum or aluminium when the exact shape required is known, but these cannot be

moulded to suit altering requirements. Of all materials gutta-percha is the worst, since it rapidly becomes roughened, and sets up irritation. India-rubber is far preferable to gutta-percha, but, being somewhat absorbent, it retains the secretions, and so is apt, before long, to become offensive and often to produce some vaginal irritation.

The form of pessary recommended by Dr. Thomas is shown in Fig. 27. The upper part is made very thick, so as, by its actual bulk, to prevent the return of the fundus,

FIG. 27.

Thomas's Retroflexion Pessary.

while, at the same time, its pressure is distributed. This is an excellent device, the only drawback to it being that it greatly increases the price of the instrument. The other peculiarity is that the lower end is bent much downward, to avoid pressure on the urethra, and is nearly pointed, so as to rest between the rami of the pubes, and prevent rotation. A somewhat similar shape is preferred by Dr. Barnes. The objection to this is that the pointed end forms a wedge, to facilitate the escape of the pessary, and also, owing to its strong pubic curve, forms an obstruction in the vulva, very inconvenient to married women, while the pessary shown in Figs. 25 and 26 rests completely behind and above the apex of the pubic arch. The great advantage of Hodge's pessary is that it does not prevent coitus, but often leads to conception where sterility had previously existed. It is therefore important, in married women, to see that the lower limb of the pessary lies close against the

anterior vaginal wall, and, at the same time, high up, and sheltered behind the pubes. In Dr. Greenhalgh's pessary, in order to fulfil this end, the lower limb is made of soft rubber tubing, the whole instrument being of somewhat elastic wire covered with india-rubber, so that it can be pressed together during its introduction. It has, therefore, a disadvantage in point of cleanliness, and, the india-rubber becoming very soft in the vagina, the unsupported corners are apt to press injuriously. I have met with several instances in which they had ulcerated very deeply into the vaginal walls.

In some instances, when there is considerable hyperæmia, swelling, and tenderness of the fundus, as is the case more frequently in retroflexion than in retroversion, it is desirable, before attempting to use a pessary, to treat these conditions by rest for a few days in bed, with saline aperients and sedatives, and sometimes local depletion. Recourse should always be had to the same plan when a pessary has been tried, but cannot be tolerated on account of the pressure which it exerts upon the fundus.

Before a pessary is inserted the uterus should be replaced, if possible, by the finger. This may be done in the lateral or, what is better, the semiprone position. By one or two fingers the perinæum is retracted, air allowed to enter the vagina, the fundus pushed upwards, and the cervix, if it looks too much forward, is afterwards drawn backward. Sometimes the external hand above the pubes may assist in bringing the fundus completely forward. The introduction of a Hodge's pessary itself will often effect or complete the restoration of the uterus. For its adjustment the patient is placed in the left lateral or semiprone position, and the pessary is turned edgewise until it has more than half passed through the vulva, the perinæum being meanwhile retracted by a finger of the left hand, and the pessary directed rather backwards, to avoid pressure on the

symphysis. It is then rotated into the direction which it is to
occupy, having the concavity of its upper or sacral curve
looking forwards. The index finger of the right hand is
then introduced behind the lower limb, and, passing through
the pessary, hooks the upper limb backward over the cer-
vix, and, at the same time, pushes it upward into the pos-
terior cul-de-sac. The upper limb always tends to run up
in front of the cervix, and when the pessary has a strong
sacral curve it may be difficult to overcome this tendency.
It is then often useful not to rotate the pessary completely
into its destined direction, but to hold it somewhat diagon-
ally until the upper limb has passed behind the cervix.
The pessary should cause no pain when once in position.
If it does so it is a sign that it is too large, too angular, or
improperly adjusted, and it should at once be removed.

If in a case of retroflexion the fundus can be restored to
a considerable degree by these means, the pessary may be
left gradually to bring about a more complete reduction,
and its leverage action is more effective when the patient is
up and about than when she is confined to bed. In retro-
version also, such treatment will rarely fail. It sometimes
happens, however, in retroflexion either that the pessary
fails to raise the uterus at all, and only exercises painful
pressure upon it, or that its upper limb fits it to the con-
cavity in its posterior surface, and merely elevates the whole
organ, while the fundus remains flexed over the pessary.
It is then necessary, in the first place, to restore the uterus
by other means, of which the chief are: (1) pressure *per
rectum;* (2) the postural method; (3) the use of the sound
as a repositor.

(1.) Pressure by the finger on the fundus from the rec-
tum is more effectual than by the vagina, since the lever-
age is greater, and it may sometimes be conveniently ap-
plied when the uterus is found incompletely restored after
adjustment of a pessary.

(2.) In the postural method the object is to place the patient in such a position that the inlet of the pelvis looks vertically downward, the abdominal muscles are relaxed, and the weight of the abdominal contents tends to produce a negative pressure in the pelvis. If air be at the same time allowed to enter the vagina, by separating the labia if necessary, the vagina becomes distended into an actual cavity, the uterus recedes, and the fundus may be restored by this means alone, its own gravity assisting in some small measure. The recession of the fundus may also be assisted by pressure from one or two fingers in the vagina or rectum. Sometimes, however, the fundus merely recedes out of reach, the retroflexion or retroversion remaining unrectified, and the third method is then the only effectual one. In carrying out the postural method, the patient may be placed in the knee-elbow or genu-cubital position on a hard bed or sofa. Care must be taken that the thighs are exactly vertical, and the chest low. In this way the axis of the trunk may be inclined as much as 35° to the horizon, the hips being higher than the shoulders, a position which will give the best result, taking the normal pelvic inclination as 55°. Some authorities reject the knee-elbow, and are content only with the genu-pectoral or knee-chest position. Most persons, however, will find, if they try the experiment of kneeling in this position on the floor, that it is impossible to touch the same plane with the chest. Moreover, to increase the inclination of the trunk beyond 35° would diminish the efficacy of the position. It is often of use in retroflexion or retroversion to instruct patients themselves to adopt this position once or twice a day, as well as to lie, as far as possible, in the prone or semi-prone position when in bed.

(3.) The use of the sound as a repositor is the most effectual of all methods, but is not so safe as the two already mentioned, unless both caution and dexterity be employed.

Those, however, who possess the necessary skill will generally be able to restore the uterus in this way with much less discomfort to the patient than by either of the other means. The sound has its intrauterine portion made nearly straight, and is introduced in the mode already described, the handle being necessarily carried far forward, and the point directed backward. If it can only be introduced by giving it an increased curve, it should be withdrawn, and introduced a second or third time with a gradually diminished curve, so rendering the axis of the uterus nearly straight, and converting the retroflexion into a retroversion. The first stage of replacement is then to carry the handle of the sound backward toward the perinæum, thereby partially elevating the fundus. The operator should do this with great gentleness, remembering the powerful leverage he is exercising, and any excessive resistance, as from adhesions, will then be discovered at this stage, and the attempt abandoned. It is not very usual, however, for the fundus to be tethered by adhesions without the existence of some periuterine thickening, which may be detected by a skilful observer. It is more common to find a fixation which is only apparent, and due to the swollen fundus having become gripped between the utero-sacral ligaments at either side. The second stage in reduction is to sweep round the handle of the sound through a rather wide semicircle, so that the handle and stem describe a semicone, and the intrauterine portion rotates nearly on its own axis (Fig. 28). The third stage is to carry the handle again backward toward the perinæum, and so bring the fundus completely forward. If the handle of the sound were simply rotated, its point would necessarily describe a circle, and press injuriously upon the fundus.

A uterine repositor has been invented, in which the handle is not rotated, but the direction of the intrauterine portion is changed by means of a screw. The sound, however, if used in the way described, is more convenient and quite as

safe. After withdrawal of the sound, the pessary may often be adjusted before the displacement has had time to recur. If, however, the fundus drops back at the moment of its withdrawal, one of two methods may be used. With great

Fig. 28.

Diagram to Illustrate the Mode of Replacing the Uterus by the Sound.

caution, either the pessary may be passed into position over the handle of the sound, or restoration with the sound may be effected while the pessary is in the vagina, the uterus, in both cases, being held in perfect position until the pessary is fully adjusted.

There is another method of keeping a retroflexed uterus in place, which is mechanically the most perfect, although for other reasons undesirable, and which may be tried if all other means fail. This is the use of an intrauterine stem in conjunction, either with a simple Hodge's pessary, or with some vaginal support. If, however, a Hodge's pessary be chosen with a posterior limb long enough and curved enough, and if sufficient perseverance be shown in the use of the sound and postural treatment as adjuncts, a stem pessary will rarely be required. The Hodge's pessary may fail, however, when the posterior cul-de-sac is too ill-developed, or

too atrophied, to admit an instrument of sufficient length,
or when the vaginal walls are so excessively relaxed as to
take no grasp of even a large pessary. The choice of a
stem pessary, and the precautions which must be observed
in its use, will be considered under the head of anteflexion
(see p. 106).

When there is difficulty in keeping the uterus in place, it
is sometimes necessary to use at first a Hodge's pessary,
which is rather a tight fit for the vagina, but which after
awhile may be exchanged for a smaller one. The action of
a pessary should be observed every week or two for the first
few weeks. Afterwards, patients should be enjoined to
come for observation about every two months, and to use a
vaginal injection twice a day.

In cases of retroversion or retroflexion, in which the
uterus is too tender to allow any pessary to be tolerated, it
may be supported temporarily by tampons of cotton-wool
soaked in carbolized or iodized glycerin. The uterus is first
restored by one of the methods already described. A small
tampon is then placed behind the cervix, to prevent the
fundus again dropping backward ; a second and larger tam-
pon is adjusted in front of the cervix in such a way as to
press it backward. The tampons should be changed every
second day. In the case of retroflexion, however, this
method rarely effects more than a very partial restoration.

The use of Hodge's pessary may be rendered impossible
by the presence of one or both prolapsed and tender ovaries,
pressure on which cannot be tolerated. It is then often nec-
essary to commence with treatment directed to the ovaries,
but it is very desirable in such cases to restore the uterus,
since the ovaries are then elevated at the same time, and a
form of pessary may sometimes be found by trial whose up-
per limb rests between the fundus and the ovary, and does
not press painfully.

A pessary has been invented by Schultze, with the ob-

ject of pushing the cervix directly backward, instead of pulling it through the medium of its vaginal attachment. It resembles a Hodge's pessary, of which the upper limb is rather narrow, and is doubled back upon the lower portion, so as to form a loop which lies in front of and encircles the cervix. A somewhat modified instrument on the same principle, in the form of a figure-of-eight doubled upon itself, has been recommended by Dr. John Williams. These pessaries do not accommodate themselves so naturally to the shape of the vagina as Hodge's pessary, and they cause much more obstruction to coitus. They also lose the advantage of the leverage in directly raising the fundus. They may be tried, however, in cases of retroversion when Hodge's pessary fails from the presence of a prolapsed

Fig. 29.

Cutter's Pessary for Retroflexion modified by Thomas.

ovary or shortness of the posterior cul-de-sac, or when the cervix is held forward by congenital shortness of the anterior vaginal wall, since this vaginal wall is more directly stretched by their means.

A useful form of pessary for cases when the vagina is

too lax to keep a Hodge's pessary in place, or when it is desired to effect a gradual stretching of a short posterior cul-de-sac, is Cutter's pessary for retroflexion (Fig. 29). From its having an external support, this pessary is more likely to communicate shocks to the fundus; it has also the drawback that it must be introduced by the patient herself daily, and removed at night, and hence it is liable, either to be pushed up in front of the cervix in introduction, unless some dexterity be used, or to slip into that position afterwards. To diminish the chance of this the vaginal portion of the instrument should have a very slight curvature. The single band of the instrument is carried backward over the perinæum and attached to a waist-belt, as shown in Fig. 48.

ANTEVERSION OF THE UTERUS.

Pathological Anatomy.—The normal mean position of the axis of the uterus, being nearly that of the axis of the pelvic brim, is one of anteversion in reference to the axis of the vagina. Moreover, in the standing position, when the bladder is empty, it is a normal condition for the uterus to be somewhat anteverted even in reference to the axis of the brim. A pathological anteversion, therefore, only exists when, in all positions of the body, there is a notable and persistent anterior inclination of the uterus in relation to the axis of the brim, its shape remaining unaltered. It follows from this that the angle of possible deviation cannot exceed 90° at the utmost (see Fig. 23), while that of retroversion may approximate to 180°; and this is a main reason why the symptoms of anteversion are generally milder than those of retroversion.

Causation.—All the causes before enumerated for displacements in general (see p. 70) which, when the uterus is low in the pelvis, produce retroversion or retroflexion, tend, so long as that organ remains at its proper level, to produce

rather anteversion or anteflexion. Anteversion is therefore especially associated with increased weight of the body of the uterus or excessive intra-abdominal pressure, as from tight lacing or weight of clothing, without a proportionate relaxation of the supports which maintain the centre of the uterus in its position in the pelvis. While anteflexion is frequently primary, anteversion (like retroversion and retroflexion) is usually secondary ; and the commonest of all its causes is hyperplasia of the body of the uterus. Anteversion may also be produced by fibroid tumors in the uterine wall, or adhesions the result of periuterine inflammation.

Results and Symptoms.—Slight anteversion in itself may produce little or no symptoms, and symptoms associated with it are often due rather to the hyperplasia, hyperæmia, or inflammation which was anterior to the displacement. If, however, the displacement is considerable—especially if the uterus is also large and hard—signs of pressure upon neighboring organs appear. These may closely resemble those produced by a high degree of retroversion, the fundus and cervix lying in exactly the reverse direction (see Fig. 23). From the greater size of the fundus as compared with the cervix, the bladder symptoms are commonly greater, and the rectal symptoms less, than in retroversion. When, however, the cervix is enlarged and indurated, and especially when the whole uterus is at the same time far back in the pelvis, pain in defecation and rectal tenesmus are often marked. Patients often suffer, also, from frequent calls to micturition, and dysuria in addition.

Diagnosis.—By vaginal touch the os is found to be directed too much backward and high up in the hollow of the sacrum, so that in extreme cases it can with difficulty be reached. The anterior vaginal wall is tense, from the traction exercised by the cervix, and more than usual of the body of the uterus is felt resting low down upon it. On

bimanual examination, the body of the uterus is readily
defined in this position, the fundus being close behind the
pubes when displacement is considerable.   No concavity or
angle is detected by the finger in the vagina between cervix
and body.   If no adhesions or tumor be present, the fundus
may be pushed up by the finger through the anterior cul-
de-sac until the external hand, pressed immediately above
the pubes, is able to get below it, and carry it still further
back, while the finger in the vagina draws the cervix for-
ward.   In simple anteversion the sound is hardly ever
necessary either for diagnosis or displacement, though it
may be of use to determine the degree of enlargement, or
to decide as to the presence or absence of a fibroid tumor.
It is to be remembered that when the examination is made
in the dorsal position, the degree of anteversion will gener-
ally be less than that which exists in the erect posture.

Treatment.—Any acute symptoms of hyperæmia should
be relieved by rest in bed, aperients, and sedatives, with
local depletion if required.   Prolonged rest in the dorsal
position has also a useful mechanical effect from the influ-
ence of gravity tending to reduce the displacement.   This
may be assisted by directing the patient to retain her urine,
if possible, for several hours while in this position, so that
the moderately distended bladder may push the fundus
backward.   In this, as in other displacements, all tight
clothing should be forbidden, and the skirts should be sus-
pended from the shoulders.   When any abdominal laxity
exists, and even when this is not the case if the uterus is
much enlarged, an elastic abdominal belt, with a pad to
press above the pubes, often gives great relief.   It acts
partly by directly pushing the fundus backward and partly
by diminishing the mobility of the viscera, and keeping up
a gentle pressure upon the pelvic organs.   It is thus often
of value in cases of hyperæmia, even without any displace-
ment.

Most vaginal pessaries for anteversion or anteflexion have a double action, like those for retroflexion. By pressure on the anterior vaginal wall they directly push up the fundus, and at the same time they render that wall arched, and so shorten it by bringing its extremities nearer together, and thereby draw the cervix forward (Figs. 31 and 35). The base of the bladder, however, appears to be more vulnerable to injury from any considerable pressure than the posterior cul-de-sac, and all these pessaries not only adapt themselves less naturally to the vagina than Hodge's pessary, but, by occupying mainly the lower part of that canal, form an obstacle to coitus, and are liable to extraordinary displacements in married women. It is, therefore, generally desirable, when anteversion is moderate, to try first the effect of treatment adapted to any concomitant hyperæmia or hyperplasia, combined with the general measures already mentioned, and to use a pessary only if such treatment fails to relieve symptoms, or if the displacement is extreme, and is found to be persistent at all times and in all positions.

The condition of drawing the cervix forward is fulfilled best by an instrument which lies almost entirely in front of the cervix. Of these, perhaps the most convenient is the cradle pessary of Dr.

<div style="text-align:center">Fig. 30.</div>

Cradle Pessary.

Graily Hewitt (Fig. 30), which should be made of vulcanite, and not, as originally constructed, of wire covered with gutta-percha. Its author now recommends that it should be placed with the larger ring foremost. The position in which it usually rests is shown in Fig. 31. Its author depicts it as lying with its anterior limb resting against the anterior vaginal wall. It is obvious, however, that the pressure of
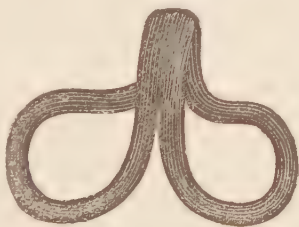
the anterior vaginal wall downward and backward upon the central bridge can only be counteracted by forces acting upward and forward upon *both* extremities. Accordingly

FIG. 31.
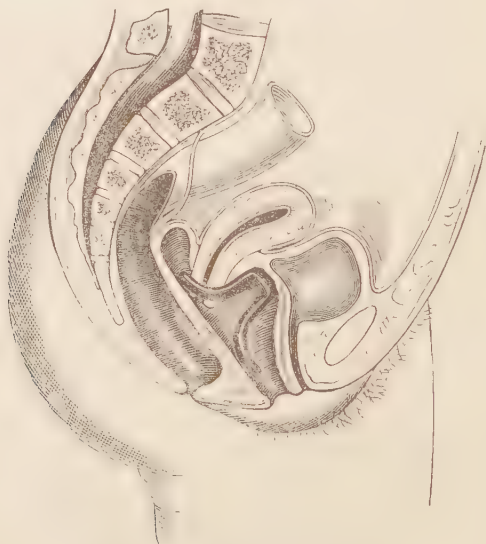
Cradle Pessary in position.

it will be found that, at any rate when there is any considerable resistance to overcome, both ends rest against the *posterior* vaginal wall, and the vaginal entrance is thus blocked.

Dr. Thomas recommends for anteversion the pessary shown in Figs. 32 and 33, consisting of Hodge's pessary, to which is attached a movable bow. For introduction, this bow is closed up, so as to lie in contact with the upper limb (as in Fig. 32), and carried to and just under the cervix; then, by the index finger, the bow is drawn forward

to an extent limited by a stop, in the position shown in Fig.
33. The cervix falls behind it, the fundus rests upon it,
and the posterior limb goes behind the cervix. This pes-

FIG. 32.

Thomas's Anteversion Pessary, closed for introduction.

sary can be very easily withdrawn by the patient by trac-
tion upon the lower limb. In another variety of this pes-
sary the movable bow is directed downward, and the ante-
rior limb of the rigid portion makes the upward pressure.
A pessary has been sold in England as Thomas's pessary,

FIG. 33.

Thomas's Anteversion Pessary, in position for use.

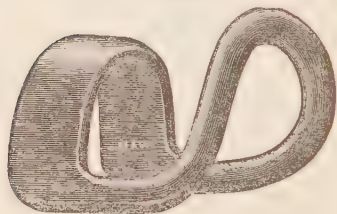which has just the opposite quality—that of being easy to
introduce and difficult to withdraw. In this the movable
bow closes up to the lower and not to the upper limb, and,

by virtue of an india-rubber spring makes elastic pressure upwards against the anterior vaginal wall. It is, therefore, not a durable instrument, as the india-rubber soon wears out.

All these instruments form a great obstacle to coitus, since they take their purchase upon the posterior vaginal wall at its lower part, to make pressure upon the anterior vaginal wall. For use in married women, I have devised the instrument shown in Fig. 34, with the object of extending to the treatment of anteversion and of corporeal anteflexion the

FIG. 34.

The Author's Anteversion Pessary.

principle of leverage, which is so useful in posterior displacements. In the case of Hodge's pessary, the leverage is really of an alternating kind, the power and the resistance being interchanged. In an expulsive effort, the anterior vaginal wall is depressed, and the upper limb of the pessary tilted upwards; when the effort is relaxed, the upper limb is depressed again to some extent by the elasticity of the posterior cul-de-sac, and the anterior vaginal wall elevated, the power in the latter case acting at the upper end of the pessary. In the ordinary form of lever pessary, the shape is such as to make the fulcrum nearer to the upper than the lower end, and then the first kind of leverage has the mechanical advantage. If, however, the pessary be so shaped that the fulcrum is nearer to its lower end, the opposite will be the case, and a moderate tension of the posterior cul-de-sac will produce a force greater than itself, pressing upwards the anterior cul-de-sac. The pessary shown in Figs. 34 and 35 is made of vulcanite, and resembles a thick Hodge's pessary, with its anterior limb replaced by a broad arch directed upwards, and nearly

square at its summit. The position in which it lies is shown in Fig. 35. By its shape alone, without any leverage, it elevates the anterior vaginal wall in considerable degree, but it will be found in practice that the lower corners do not

Fig. 35.
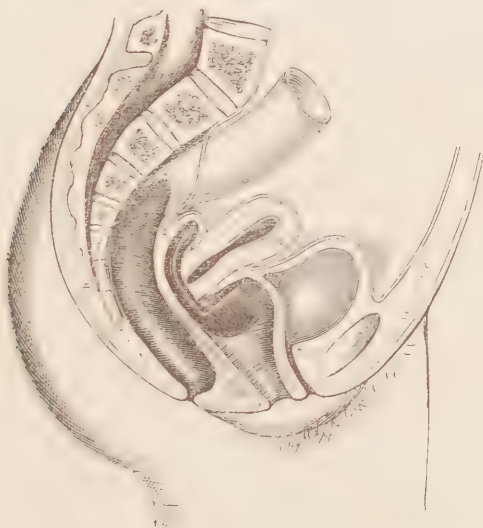
The Author's Anteversion Pessary, in position.

lie against the posterior vaginal wall, but the whole of the anterior extremity is tilted somewhat upwards, in consequence of the tension of the posterior cul-de-sac. In introducing the instrument, it is first passed entirely within the vulva, with the upper limb in front of the cervix; the index finger is then passed through it, and hooks the upper limb backward over the cervix and into the posterior cul-de-sac. It is withdrawn by hooking the index finger over one of the lower angles, and making traction upon that. Since it occupies a higher position in the vagina than even

a Hodge's pessary, it can be worn without discomfort by married women. Care must be taken that the posterior limb is not too long, since otherwise it would tend to draw the cervix backward through the medium of its vaginal attachment. As compared with the cradle pessary, it has the disadvantage that a patient cannot remove it herself. When in position, however, it is very easily tolerated, and there is this safety in its use, that it would be difficult to introduce a pessary which, when in place, would prove too large. As being more difficult to introduce and withdraw than the cradle pessary, it is not suitable for virgins, or cases in which the vaginal outlet is narrow.

Of pessaries intended to elevate the fundus by means of external support the best is that form of Cutter's pessary in which the vaginal portion has a more considerable curve with its concavity forwards than the retroflexion pessary shown in Fig. 29, so that its summit rests in front of the cervix. Over the form of instrument used for retroflexion it has the advantage that it is easier for the patient herself to introduce it into the proper position. It is most likely to be useful in the case of anteversion combined with partial prolapse, in that of married women who dislike wearing a pessary constantly, or when it is found that an internal pessary cannot be tolerated.

As in the case of posterior displacements, it is impossible, by direct pressure through the vaginal wall, to restore the fundus completely to its normal position, but it can only be elevated to a certain extent, while there is, in this case, no mechanism tending to complete the restoration. All ante-version or anteflexion pessaries require more careful watching than is necessary with the ordinary Hodge's pessary.

ANTEFLEXION OF THE UTERUS.

Pathological Anatomy.—Since a slight anterior curvature of the uterine axis is normal or, at any rate, very com-

mon in the nulliparous uterus, a pathological anteflexion only exists when there is a curvature looking forwards and exceeding 15° or 20°, while a retroflexion, even of the smallest degree, is morbid. Acquired anteflexion may be combined with anteversion, so that the os is tilted too much backward, the uterus having partly yielded as a whole to the displacing force, and partly undergone bending. In primary anteflexion the os is most frequently directed too much forward. The classification of Thomas into corporeal, cervical, or cervico-corporeal anteflexion, according as the body alone, the cervix alone, or both cervix and body, are flexed forward, is a useful one, since each condition calls for a distinct mode of treatment (Fig. 36). Anteflexion combined with retroversion may also exist, the axis of the

Fig. 36
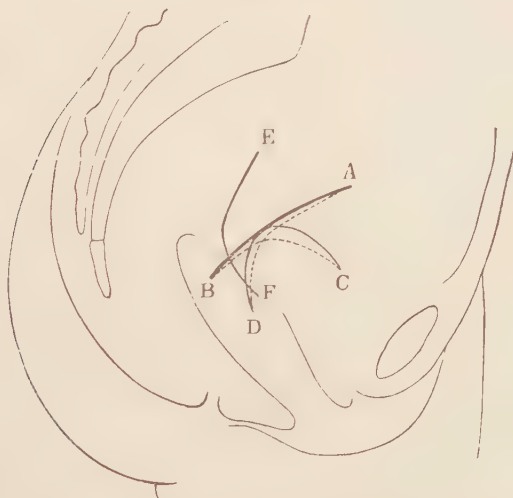
Diagram to illustrate the Varieties of Anteflexion.

A B, normal direction of uterine axis; A D, cervical anteflexion; C B, corporeal anteflexion; C D, cervico-corporeal anteflexion; E F, anteflexion with retroversion.

uterus being concave forwards, but its body displaced backwards (Fig. 36, E F). In acquired anteflexion the curvature is generally sharper at one part, usually near the internal os, and the canal is apt to be here flattened, and so obstructed. In primary anteflexion the curve is generally more uniform, and the uterine tissue harder, so that there is not so much flattening of the canal, though its diameter is usually less than normal. Statistics vary very widely as to the relative frequency of anterior and posterior displacements of the uterus. The general opinion is, however, that anterior displacements, especially primary anteflexions, are much commoner, but that of cases of grave displacement, calling imperatively for mechanical treatment, retroflexions are the most common. The discrepancy is explained, in great measure, by the difference between different authors as to the degree of anteflexion or anteversion which they would regard as pathological.

Causation.—Acquired anteflexion is produced by the came causes as anteversion, with the addition of softness of the uterine tissue, or it may result from morbid softness alone, such as is not uncommon in ill-nourished girls, the uterus yielding from its own weight, or from the effect of forces which are normally in action. Before the age of puberty it is normal, or at any rate very common, for the uterine axis to have a greater physiological anteflexion than it has in the adult, while it straightens itself when the uterus reaches its full development and becomes firmer. Hence anteflexion is very frequently primary, and consists in an abnormal persistence or exaggeration of a state which, in childhood, is hardly to be considered pathological. In this case the anterior uterine wall is often thinner and less developed than the posterior; the anterior lip of the cervix is usually too short, and frequently the anterior vaginal wall is itself short. Such a condition is often associated with a conical cervix and small external os, and sometimes

with general smallness of the whole uterus. Frequently there are also signs of imperfect ovarian activity ; the vagina may itself be small, and even the bony pelvis may share in the want of full development. An acquired cervico-corporeal anteflexion has been ascribed to contraction of the utero-sacral ligaments, the result of localized cellulitis or *parametritis posterior*, dragging the centre of the uterus backwards. Acquired cervical anteflexion may also result from pressure against the posterior vaginal wall, when the whole uterus is displaced downward and backward, as from tight lacing. In extreme cases of cervico-corporeal anteflexion the total angle of flexion may approximate to 180°, fundus and os looking nearly in the same direction.

Results and Symptoms.—The symptoms of acquired anteflexion differ from those of anteversion in that there is less interference with the functions of the rectum, while symptoms are generally added similar to those common in retroflexion, but less severe, and due to the obstruction of the cervical canal and of the venous circulation. Such are dysmenorrhœa, sterility, hyperæmia, endometritis, and reflex nervous and digestive disturbances. To these may be added hyperplasia, or chronic metritis. Primary anteflexion may produce no symptoms whatever, if the menstrual flow is moderate and perfectly fluid. Frequently it leads to sterility only, but even this does not necessarily follow, since conception is rendered only difficult, not impossible. The commonest symptom is dysmenorrhœa, usually commencing from the outset of menstruation, but often gradually increasing in severity, a condition of which anteflexion, associated with a rather small cervical canal, is by far the commonest causes. To dysmenorrhœa may be added hyperæmia and endometritis, with the other results of obstruction. These are especially liable to be induced after marriage in women who up to that time had no symptoms, or **only that of slight dysmenorrhœa.**

Diagnosis.—The direction of the os and cervix is readily discovered by vaginal touch. In cervical anteflexion, a considerable length of the cervix may sometimes be traced behind the os, and the use of the sound may be necessary to distinguish between cervical anteflexion and partial retroversion. In corporeal anteflexion the fundus is felt resting low upon the anterior vaginal wall, and may be defined on bimanual examination as described in the case of anteversion. It is found to move in conjunction with the cervix, and a concavity or angle is felt between the two. On passing the sound it is generally arrested near the internal os, and can only be carried on to the fundus either by carrying the handle far back toward the perinæum, by pushing up the fundus by the finger in the vagina, or by withdrawing the instrument and reintroducing it with an increased curve. The slighter degrees of corporeal anteflexion may be difficult to detect, especially in virgins when the vaginal walls are tense, and the exact curve of the uterine axis can then only be determined by means of the sound. The conditions chiefly to be distinguished from anteflexion are a fibroid in the anterior uterine wall, thickenings due to cellulitic or peritoneal inflammation, or to blood effusion, or tumors or calculi in the bladder. All of these conditions, except calculus, are distinguished by their fixity and ill-defined outline, but the most perfect evidence is that derived from the sound, especially in distinguishing the case of a fibroid in the anterior uterine wall. If the swelling felt anteriorly disappears when the uterus is straightened by the sound, or turned into a position of slight retroflexion, it is proved to have consisted of the fundus alone.

Treatment.—Treatment is, of course, only necessary when symptoms exist which are referable to the anteflexion, but in the case of primary anteflexion, the only symptom may be that of sterility. In the case of corporeal anteflexion, when the body of the uterus is bulky and soft, as in ac-

quired flexions, it may sometimes be replaced with the
fingers alone, by pushing up the fundus from the vagina,
and then pressing it backwards by the outside hand above
the pubes. Generally the sound is necessary for replace-
ment, but it should not be employed if there is any sign of
periuterine inflammation or acute hyperæmia. If it can
only be passed with an extra curve, it is withdrawn and in-
troduced a second or third time, till it can be passed with
its intrauterine portion nearly straight. It may then be re-
versed by a *tour de maître* precisely the converse of that
described in the treatment of retroflexion (p. 86). The
uterus is thus held for a short time in a position of slight
retroflexion. Generally the anteflexion soon recurs, but a
repetition of this process at intervals of a few days may
effect a gradual improvement. At the same time general
treatment for the cure of any hyperæmia or inflammation
present, with rest in the dorsal position, should be followed
out, as in anteversion ; and, in addition, nourishing diet and
tonics should be given if the uterus is soft from malnutri-
tion. If these means prove insufficient, the cradle pessary,
or, in the case of married women, that shown in Figs. 34,
35 may be tried, as in the case of anteversion (see pp. 95-
98). The cure of anteflexion by these pessaries, however,
can hardly ever be so complete as that of retroflexion by
Hodge's pessary, since there are not, as in that case, any
natural forces called into play to complete the restoration.

The above means often fail when the uterus is rigid in its
abnormal state, either in primary flexions or acquired flex-
ions of long standing, and they are useless in anteflexion of
the cervix alone. In cervical anteflexion, the best treat-
ment is to incise the cervix backward, so as to convert the
os into an elongated opening, more nearly in a line with
the upper part of the cervical canal (see Figs. 16, 18). The
mode of making the incision and the after-treatment are
described under the head of stenosis of the external os

(p. 57). When the fundus is flexed forwards as well as the cervix, other treatment will generally be required in addition. It is not without risk to introduce an intrauterine stem immediately after incision, as recommended by Barnes and Marion Sims. If used at all at such a time, a plain stem of glass is the most innocuous. It is safer, however, to wait till the incision has healed, after which time stems or tents may be used if required. Marion Sims recommends the incision of the anterior uterine wall near the internal os in addition to that of the posterior wall of the cervix. It is impossible, however, when there is considerable corporeal flexion to straighten in this way the cervical canal without a dangerously deep incision. Such an incision, moreover, generally tends to close again.

When the uterus is rigid, as well as flexed, a vaginal pessary will only tilt the fundus upwards and cervix forwards without altering the shape of the uterus. The occasional use of a laminaria tent, reaching nearly up to the fundus, is then of service. It acts by softening the walls of the uterus, as well as by straightening it for the time being. The most effectual means of straightening the uterus, however, is one which has been the subject of much controversy, namely, the use of intrauterine stem pessaries. While some distinguished authors have denounced them entirely, others have expressed apparently oversanguine views of their efficacy. Of late, however, opinion has again tended more in favor of their use in certain cases. The objection to them is, not that they are mechanically ineffectual, but that they always excite a certain degree of irritation and hyperplasia, while they have not unfrequently produced severe, and even fatal metritis and peritonitis. Special precautions are therefore required in applying them, and they should be used, not as permanent supports, but as a temporary treatment, to be continued for a limited number of months, while a patient is kept under observation.

The first precaution necessary is never to use an intra-uterine stem in a case in which periuterine inflammation has at any time existed, since this is always liable to be re-kindled by any slight exciting cause. The second is not to use one when any considerable tenderness or hyperæmia of the uterus is present, until this condition has first been sub-dued by suitable treatment, especially rest in bed and local depletion. The cases to which stem-pessaries are specially applicable are those of primary flexion, in which the uterus has never been the subject of any considerable inflamma-tion. When the flexion is secondary to chronic hyperæmia or metritis, it is more frequently found that the stem pessary cannot be tolerated. Before applying a stem, the sound should be introduced occasionally, to ascertain the tolerance of the uterus. It is better to keep a patient in bed for two or three days on the first introduction of the pessary, and if it cause at first any great pain, it should be with-drawn for awhile and again introduced, being worn a little longer on each occasion, until the uterus is gradually brought to tolerate its presence. A patient who is wearing an intrauterine stem should always either be within reach of immediate medical assistance, or should have the means of removing the pessary herself by a thread attached to its lower end in case any great pain, or any rigor or feverish-ness should supervene. The stem should be withdrawn for the purpose of cleansing it as often as once a month, and at first it is generally better to remove it during menstrua-tion, although afterwards, if the uterus is sufficiently toler-ant, it may be left during the periods. The mere presence of a stem always tends to produce some hyperæmia of the uterus, with increased secretion, and to increase the men-strual flow ; and its use is thus indicated rather in cases of scanty than in those of profuse menstruation. It is often a question whether the advantage gained by straightening the uterus preponderates over the inconvenience caused.

When, however, the stimulus of the stem is removed, hyperæmia diminishes, and a process akin to involution may take place. If, therefore, the straightening of the uterine axis proves in any degree permanent, good may result, even if none were apparent while the pessary was worn ; and a patient previously sterile may conceive within two or three months after its removal.

The varieties of intrauterine stem which prove useful under different circumstances may be divided into three classes,— simple straight stems, stems with expanding branches, and straight stems combined with a vaginal support. Stems attached to external supports are to be altogether condemned, since they destroy the natural mobility of the uterus, and expose it to dangerous shocks. A straight solid stem of vulcanite or glass, ending in a disk or sphere, is the least irritating of all these pessaries, but it is generally difficult to keep it in place. If the stem ends in a hollow sphere ¾ inch in diameter, it receives a better support from the posterior vaginal wall, and may be kept in place by a tampon soaked in carbolized glycerin, and placed in front of the sphere. The tampon should be changed every second day. Sometimes the stem is retained without the tampon, if the uterus tends to a position of slight anteversion, or is brought into that position by a Hodge's pessary used in conjunction with the stem. The stem must be a quarter of an inch shorter than the uterine cavity, that it may not touch the fundus.

Simple elastic stems have been invented by Dr. Greenhalgh and others, with the view of straightening the canal, not immediately, but gradually. These are now made of pure black india-rubber, with bulging projections near the extremity, which serve to retain them within the uterus (Fig. 37). They are most easily introduced by means of Priestley's dilating sound (Fig. 19), which is expanded sufficiently to hold the pessary in a somewhat elongated con-

dition. Dr. Greenhalgh recommends that the uterus should not be previously dilated by any tent, but that a small solid stem should be first used if the canal is small. These pessaries have very slight effect in counteracting any strong

Greenhalgh's Elastic Intrauterine Stem Pessary.

tendency to flexion, except so far as any dilatation of the canal tends somewhat to straighten it, and they have the disadvantage that india-rubber is less cleanly than vulcanite, and is apt to produce an offensive discharge, and so cause irritation. They are sometimes useful when a solid stem is not tolerated.

Expanding stems are made with two elastic lateral branches, which are introduced closed, and then spring open so as to lie against the sides of the body of the uterus, and render the instrument self-retaining. It follows that the tendency to flexion must be resisted by the comparatively sharp edges of the diverging branches. On this account these pessaries are more likely to set up irritation in cases of flexion than a simple straight stem, though their perfect self-retaining quality makes them very convenient, when tolerated. As a general rule, they are more suitable for

cases of stenosis or amenorrhœa.   Perhaps the best form of
this pessary is that of Dr. Thomas Chambers (Fig. 38).
This is made of vulcanite, and the introducer is a hollow
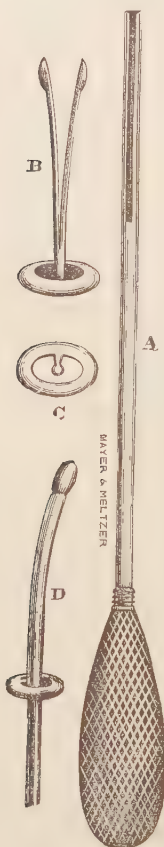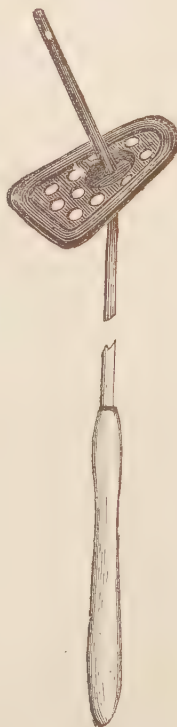

Fig. 38.—Chambers's Intrauterine Stem Pessary. A, introducer; B, stem; C,
transverse section at base of stem; D, introducer, holding stem in position for
introduction.

Fig. 39.—Wynn Williams's Intrauterine Stem Pessary.

cylinder which slides over the branches, and holds them together until it is withdrawn. Another form of expanding stem is hollow in its lower part, and the introducer is passed through the canal so formed, which afterwards affords a ready exit for the uterine secretions. Previous dilatation of the cervix is generally required before the introduction of this pessary, while that of Dr. Chambers is no larger than the ordinary sound.

Uterine stems which rest upon vaginal supports should not be rigidly connected with these, that the natural mobility of the uterus may be respected as far as possible. In the pessary of Dr. Wynn Williams (Fig. 39), the support consists of a somewhat oval ring having an india-rubber diaphragm, near the centre of which is a perforated cup. The straight stem is first guided into place, then by means of the perforation the shield is passed over the handle of the introducer, and the cup then holds the bulb of the stem securely. In the pessary of Dr. Thomas* a simple straight stem rests, by its bulbous extremity, in a cup fixed near the centre of a Hodge's pessary. The former of these is a very convenient instrument for anteflexion; the latter keeps the uterus more effectually in position in retroflexion. In Dr. Routh's pessary† the stem is attached to a crossbar fitted to a Hodge's pessary, and adjustable by means of a screw, according as there is tendency to anteversion or retroversion.

PROLAPSE OF THE UTERUS AND VAGINA.

**Pathological Anatomy.**—From the close connection of the uterus with the bladder and anterior vaginal wall, these structures necessarily take part in all downward displacements, and it will therefore be convenient to consider pro-

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* This and the other pessaries of Dr. Thomas are made by Messrs. Krohne & Sesemann, 8 Duke Street, Manchester Square.

† Made by Mr. Russell, 57 George Street, Portman Square.

lapse of the vagina in association with prolapse of the uterus. Descent of the uterus has commonly been termed prolapsus so long as the cervix remains within the vulva, and procidentia when it passes outside, although, from the derivation of the words, an opposite usage would have been more appropriate. A better classification is that of Dr. Thomas into three stages of prolapsus,—the first stage, in which the uterus remains entirely within the vulva (Fig. 40); the second, in which it passes partially outside (Fig. 41); and the third, in which the whole uterus is extruded externally (Fig. 42). As the uterus descends the cervix tends to move in the direction of the vagina, as being that of least resistance, and thus the axis of the uterus follows the curved axis of the pelvis, and becomes more and more retroverted in proportion as it becomes lower (Fig. 40).

FIG. 40.
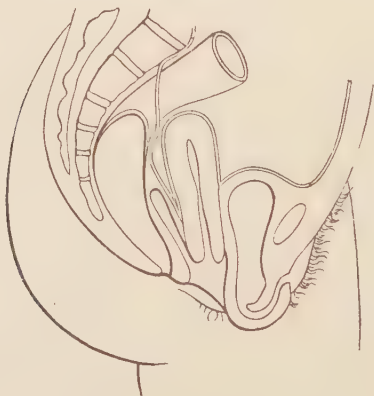
Prolapse of the First Degree.

The two chief causes of retroflexion then come into play (see p. 75), so that this displacement is commonly added to retroversion, and the fundus lies low in the hollow of the

sacrum (Figs. 24 and 41). When the uterus is finally extruded, it is always in a position of combined retroversion and retroflexion (Fig. 42), unless it has been previously fixed in a position of anteflexion by the presence of a fibroid tumor or other such cause. An important distinction must be made between simple prolapse of the uterus and prolapse associated with elongation of the supravaginal cervix, a much commoner condition.

Causation.—In *simple prolapse of the uterus*, the uterus itself may be the prime factor in the descent, and may overcome the resistance of its supports, or prolapse may primarily affect the anterior vaginal wall, with the base of the bladder, and these may draw down the uterus. A third and still commoner condition is that in which the two influences are more or less combined. The first causation in its most pure form is seen sometimes in the case of virgins, when the prolapse is due to hyperplasia of the whole uterus, or of the vaginal cervix, to the presence of a fibroid tumor, or simply to excessive muscular exertion without any uterine enlargement. The resistance of the vagina, and even that of an intact hymen, are thus overcome. In most cases of this kind, however, there is some antecedent relaxation of the vaginal walls from chronic leucorrhœa or other cause. Sometimes prolapse occurs in old women, even when the uterus is atrophied and considerably lighter than normal. The displacement then often arises from deficient support in the soft parts, owing to disappearance of fat. Among the exciting causes of prolapse, apart from the uterus itself, the most notable are laborious occupations, chronic cough or constipation, too early getting up after delivery, and rupture of the perinæum. In the last of these conditions the vagina not only loses its supporting power, but becomes an active factor in causing the prolapse. The base of the cylindrical muscular column, which the nulliparous vagina normally forms, and part of its circumference at its lower

portion being destroyed, its anterior wall is unsupported, and bulges through the vulva, carrying down with it the bladder, while at the same time it makes traction upon the cervix. Destruction of the perineal body also takes away the direct resistance to considerable descent which the pelvic floor affords, and renders the downward path of the uterus shorter. Even without any perineal rupture, sub-involution of the vagina after delivery or relaxation of its walls may transform it from a support into an agent of displacement. Another important cause contributing to the weakening of the anterior vaginal wall is habitual or occasional overdistension of the bladder.

Prolapse Associated with Elongation of the Supravaginal Cervix.—In the great majority of cases in which the cervix appears externally the uterine cavity is found to be much elongated. An old doctrine was revived by Huguier, who separated this condition entirely from prolapse, and considered that the fundus usually remained at its normal level, the cervical hypertrophy being primary. Out of sixty reported cases of prolapse, in which the cervix was protruded externally, he found only two cases of true prolapse. Huguier has been followed in the main by Barnes and others. On measurement with the sound, however, it will be found that the elongated uterine cavity is frequently about $4\frac{1}{2}$ inches long, and rarely much exceeds 5 inches, while the procident mass may protrude from 1 to 3 or more inches outside the vulva. A line drawn along the pelvic curve from the normal position of the fundus to a point 2 inches outside the vulva measures more than $6\frac{1}{2}$ inches, and it is, therefore, clear from measurement that the fundus is almost always, in these cases, depressed more or less below its normal level. In the majority of cases, also, the sound will show the fundus to be more or less retroflexed, lying in the hollow of the sacrum (Fig. 41). Moreover, the elongated cervix is invariably increased in length out of proportion

to its breadth, and often it is actually attenuated, and has become elastic instead of being a firm muscular structure. This is a proof that the change is, in the main, the result of tension, although the hyperplasia may have been due in part to a state of hyperæmia, or subacute inflammation with subinvolution, taking its departure from labor.

There are two ways in which tension, tending to elongate the cervix, may arise. The first is due to primary prolapse of the anterior vaginal wall with the base of the bladder, which drags the uterus downward at the point of vaginal attachment, while the uterine ligaments, attached near the centre of the organ, tend to keep it in place. In most cases the yielding takes place partly in the ligaments leading to

FIG. 41.

Prolapse of the Second Degree (or Procidentia).

prolapse, and partly by stretching of the intervening portion of cervix. The next mode is one which is not noticed in textbooks, but is capable of evoking a much greater force. It arises when the cervix, already partially prolapsed, is extruded through the vulva by any sudden effort, and is there gripped and partially strangulated, and its return prevented

for a greater or less time. The elastic attachments, stretched for the moment, thus tend to restore the uterus and exert a tensile force on the cervix which may approximate in magnitude to the primary expulsive force of which it is the recoil, and is likely to be much greater than the mere weight of the anterior vaginal wall with the base of the bladder. This view of causation agrees with the fact that the great elongation with attenuation of the cervix is only met with in those cases in which the os uteri is generally or frequently external to the body ; and that, if a case of prolapse afterwards reach the third stage (Fig. 42), and the uterus re-

FIG. 42.

Prolapse of the Third Degree (also called Procidentia).

mains entirely external, it may again be reduced in length, and its measurement be as low as or even lower than normal. Some reduction of length may even take place immediately upon the uterus being restored, from the shrinking of the elastic cervix. This abnormal elasticity is due to the muscular fibres having become atrophied in conjunc-

tion with hyperplasia of the other elements of the tissue. Primary prolapse of the *posterior* vaginal wall rarely exists except as the sequel of destruction of the perineal body. It may occur to a considerable degree without affecting the position of the uterus. The swelling so formed may or may not carry down with it a pouch of the rectum forming a rectocele. If the whole posterior vaginal cul-de-sac is carried down, the pouch of Douglas generally descends with it, and in rare cases the small intestines descend into the procident mass, and form a large bulging tumor, much exceeding the size to which a rectocele usually attains (Fig. 43).

FIG. 43.
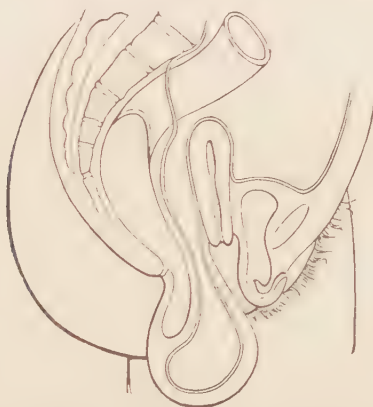
Prolapse of the Posterior Vaginal Wall, with Rectocele and Enterocele.

Results and Symptoms.—The chief symptoms of prolapse of the first degree are dragging pain in the back, hypogastrium, and groins, from the strain upon the uterine ligaments. The anterior vaginal wall, with the base of the bladder, almost always descends first, even when excessive weight of the uterus is the primary cause of displacement. As this begins to form a swelling, bulging externally (Fig. 40), it is often mistaken by the patient for the womb itself.

Though the bladder is often tolerant of this displacement some difficulty of micturition is usually produced, and sometimes tenesmus, and even cystitis, from decomposition of the urine retained in the pouch. The presence of the uterus low down in the vagina causes a sensation as of a foreign body, and tends to excite expulsive efforts, which accelerate the progress of the prolapse towards the second stage. The posterior vaginal wall, as a rule, does not, like the anterior, descend in front of the cervix, but is invaginated by it from above (Fig. 40). As the cervix protrudes externally, the anterior vaginal wall is first completely inverted, while the posterior wall for a long time maintains some duplicature posteriorly (Fig. 41), although the inversion of this also may be complete at last. From the more loose attachment of the vagina to the rectum than to the bladder, the rectum is not necessarily carried down, and rectocele may or may not be associated with prolapse of the second or third degree, while it rarely attains to any great size.

When the procident cervix remains extruded through the vulva, it becomes swollen from the interference with venous circulation ; leucorrhœa, and sometimes also menorrhagia or metrorrhagia are excited. Frequently ulcers are formed, from the effects of exposure or friction on the cervix or vaginal walls, and these may be the source of frequent slight hæmorrhage. In old-standing cases the rugæ of the vagina are lost, and the mucous membrane becomes hardened, like skin. From the effect of œdema and tension the mucous membrane also loses its close attachment to the cervix, the vaginal reflection becomes more indefinite, and the vaginal cervix may in consequence appear to have disappeared. In the third stage of prolapse one or both ovaries may descend externally with the uterus. When in this position, the uterus is commonly found rather small, and the os contracted. The pouch of Douglas often descends externally even in prolapse of the second degree, but rarely contains

any intestines (Figs. 41, 42). In recent prolapse, there is ectropion of the cervix from tension of the inverted vaginal walls, but in old cases the os may be found small, and sometimes minute, even in prolapse only of the second degree. After the menopause the cervical canal may become more or less completely occluded. Displacement of the base of the bladder may produce such obstruction to the ureters as to cause hydronephrosis or other kidney lesion, and unreduced procidentia may lead to extensive and even fatal sloughing.

Diagnosis.—When the cervix is external, it is impossible, if due care be taken, to make any error of diagnosis. The use of the sound is generally desirable, to ascertain the length and direction of the uterine cavity, and to learn how far the fundus is below its normal level. In prolapse of the first degree, the extent of displacement can only be accurately estimated by making the examination while the patient is standing, and by testing the effect of bearing-down efforts. By the recumbent position a prolapse of the second degree may be converted into one of the first, but it is generally reproduced if the patient bears down. The existence of rectocele is detected by rectal touch, and the degree of cystocele may be estimated by passing a curved catheter or sound into the bladder, and turning its point downward into the prolapsed pouch.

Treatment.—The view here adopted as to the essentially secondary character, in the majority of cases, of cervical elongation associated with prolapse, has an important bearing on treatment. Huguier and others, accepting the logical result of their theory, have considered the only curative treatment to be excision, not only of the vaginal, but of a portion of the supravaginal cervix. The dissection of this portion of the cervix away from the bladder in front and the peritoneum posteriorly, involves the probability of considerable haemorrhage, with the consequent risk of septic absorption, as well as some danger of opening the bladder

or peritoneal cavity. Hence few authorities in Britain have thought it desirable, for the cure of an affection not endangering life, to subject a patient to so serious an operation. If, however, the elongation be, in the main, secondary, it may be expected that, if means be found to maintain the cervix for a sufficiently long period at its normal level, and if at the same time, any chronic inflammation present be suitably treated, the elongation will in the end diminish or disappear. The necessity for amputation is then limited, as a rule, to cases in which, not the supravaginal, but the vaginal portion of the cervix is elongated. The treatment of these will be considered under the head of hyperplasia of the cervix.

Replacement of the Procident Mass.—After evacuation, if necessary, of the bladder and rectum, the patient should be placed in the semiprone position, the procident mass well lubricated, and compressed steadily by both hands so as to diminish its bulk. It may then be pressed gently upwards in the direction of the pelvic outlet, in such a way that the portion last prolapsed is returned first. The reduction is usually effected easily, but in some cases the bulk of the protruding mass may be so increased by œdema, that its return becomes very difficult. The patient should then be kept in bed for a time, in the first instance, while the swelling is supported, and treated by the application of cold by means of cooling lotions or ice, or gradual pressure by strapping or elastic bandages. In rare cases, in consequence of inflammatory adhesions in the pelvis, especially when these are associated with some tumor connected with the uterus, the procidentia may be irreducible, and it is therefore essential to use no excessive force in attempting its restoration. For an irreducible procidentia, the only available treatment is a suspensory bandage, which may support and, by gradual pressure, eventually diminish the displaced mass.

Methods of Retaining the Uterus.—The indications for ef-

fecting a radical cure are : (1.) to diminish the size of the uterus, if excessive ; (2) to take away all sources of excessive downward pressure or traction ; and (3) to restore the uterine supports to their normal condition. In general, however, the first two conditions can only be attained by protracted treatment, and the third only by an operation for restoration of the damaged perineal body, or for artificially contracting the vagina. In a large proportion of cases, therefore, it is desirable to use palliative means, and support the uterus by a pessary, which should be so chosen as to help and not hinder the means which may be used for radical improvement.

Prolonged rest in bed is, in all cases, of the greatest use in diminishing the size of the uterus, if that organ can be kept in place meanwhile, and this treatment should always be adopted in severe cases, if it is possible for the patient to carry it out, especially when any ulceration exists. The ulcers will then usually heal readily, but the healing process may be accelerated, if necessary, by passing lightly the solid nitrate of silver over the surface, or applying a solution of the same salt (gr. x–xxx ad $\mathrecht{\bar{3}}$j). If relaxation of the vagina be only moderate, and the stage of prolapse early, the use of astringents may suffice to effect a cure. Alum, tannin, iron alum, or sulphate of zinc, may be used in the form of vaginal injections ($\mathrecht{\bar{3}}$iij–iv ad $\mathrecht{\bar{3}}$j), but a more effective plan is to insert into the vagina daily two or three teaspoonfuls of either of these substances in powder, in a muslin bag, or wrapped in cotton-wool, while copious cold-water injections are used from time to time. Benefit is also derived from the constitutional effect of cold hip-baths or sea-bathing, as well as tonic medicines, especially iron and strychnia. The administration of ergot may also give tone to the muscular walls of the vagina, as well as diminish hyperæmia of the uterus. Cough or chronic constipation is to be treated by suitable remedies. As a preliminary measure, to bring the uterus and vagina into a

suitable condition for a pessary, and to allow ulcerations to
heal, it is often useful to keep up the uterus by a large vag-
inal tampon, kept in place, if necessary, by a perineal band.
This plan is especially indicated if the uterus will not re-
main in place even while the patient rests in bed, but it
may sometimes obviate the necessity for confinement in bed.
The congestive hypertrophy of the cervix may also derive
benefit from the pressure exercised by the tampon. A
sponge may be used for this purpose, but from its tendency
to promote decomposition, it requires frequent removal and
the utmost care in cleansing it. Unless these can be se-
cured, it is better to use tow, oakum (the so-called "anti-
septic marine lint"), or sheep's wool, which retains its elas-
ticity in a state of moisture and pressure better than cotton-
wool. If soaked in carbolized glycerin, to which alum or
tannin may be added, such a tampon may be left in place
two or three days.

Pessaries.—The pessary which of all others has the few-
est drawbacks, and which will generally prove effectual in
an early stage of prolapse, if the perineal body has not
been much damaged, is a Hodge's pessary of the ordinary
sigmoid shape (Figs. 25, 26). The action of this instrument
is to stretch the posterior cul-de-sac backwards and upwards,
and so hold the cervix at its normal level, and keep the
uterus in a position somewhat of anteversion. If the lower
limb be somewhat square (Fig. 25), and have but a slight
pubic curve, so that it rests behind and above the pubic
arch, it will also support the base of the bladder, and so
prevent what is often the first step in displacement (Fig.
26). It is generally necessary that the instrument should
be rather broad, but it should not be larger than is neces-
sary to secure its retention. When the perineal body is
very deficient, and the weight to be supported is considera-
ble, a pessary of this form will usually be forced out.
Another pessary, somewhat similar in its action, namely,
the elastic ring pessary, may, however, be retained. The

best form of this is that made of spiral spring covered with india-rubber. Owing to its elasticity, a ring of considerable size can easily be introduced by compressing it laterally. The two largest sizes, 3½ and 2⅝ inches in diameter respectively, will be found most useful. The diameter of the spring with its rubber covering, should be at least ½ inch, that its pressure may be readily tolerated. This pessary has the advantage that intelligent patients may be taught to introduce and remove it themselves, since, from its flatness, it naturally passes in the right direction, namely, behind the cervix, while a Hodge's pessary usually passes in front of the cervix, if introduced by an unskilled hand. If it is frequently removed, the disadvantage it has in consequence of the more absorbent character, and, consequently, inferior cleanliness of its material, is in great measure obviated. If it is worn continuously, antiseptic vaginal injections should be used daily.

As an alternative to the elastic ring pessary may be used a form of pessary which will be frequently retained, when the sigmoid Hodge's pessary would fall out. This is one in which the anterior limb is bent upward, that, viewed laterally, the instrument forms nearly an arc of a circle, about 110° in length (Figs. 44, 45). The essential point in the mechanism of this instrument is that its anterior limb rests high up above the pubic arch, distending the anterior vaginal wall, with the base of the bladder, into a pouch, and does not press against the rami of the pubes at all (Fig. 45).

Fig. 44.

The Author's Lever Pessary for Prolapse.

Its escape is thus prevented by the posterior surface of the

pubes and the posterior vaginal wall, without any assistance
from the vulval outlet or perineal body. I have had the
anterior limb of the instrument made in the form of a cyl-
inder $\frac{5}{8}$ inch in diameter, so that its pressure may be as widely
diffused as possible (Fig. 44). Even if it be of uniform
thickness, provided that the pessary is made of vulcanite,
and its bar is not less than $\frac{3}{16}$ inch in diameter, the pressure
on the base of the bladder is generally tolerated in those
cases for which the instrument is suitable, namely, those in

FIG. 45.
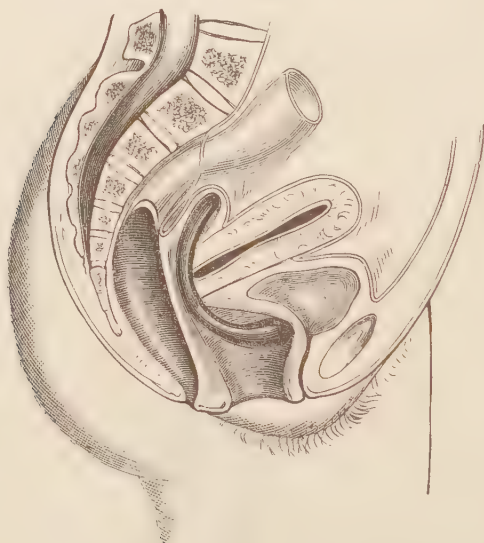
The Author's Lever Pessary for Prolapse, in position.

which the vaginal vault is much relaxed. If, however, the
posterior cul-de-sac is not capacious enough, the pressure of
the pessary may not be tolerated; and, if the vagina is so
dilated that its width is nearly equal to its length, it is liable
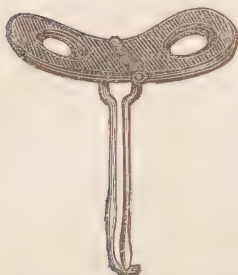to turn round sideways. Again the instrument fails, if the

vaginal cervix is so atrophied that it does not retain the posterior limb of the pessary behind it in the posterior vaginal cul-de-sac. Under such circumstances the elastic ring is preferable ; otherwise the lever pessary has the advantage that its material is more cleanly, that it does not stretch the vagina so much laterally, and that it tends to push the fundus directly upwards if retroflexed, while the ring merely draws the cervix backwards. It is therefore specially indicated when any considerable retroflexion exists. The mode of introduction of the instrument is the same as that of the sigmoid pessary (see p. 83), but its shape renders it rather more difficult to hook the posterior limb backward over the cervix into the posterior cul de-sac. In proportion to this difficulty is the security of its retention. With this, as with every other pessary, it is essential that it should be removed at regular intervals, in order that it may be cleaned and the state of the parts observed.

If the uterus be replaced, and the cervix maintained at its normal level by any of these pessaries, it is obvious that, if the organ be elongated, it must, for the time at least, either be more or less doubled upon itself, or the fundus must be elevated above its normal height. What most frequently occurs is a combination of the two effects. The uterus most readily tends to become doubled upon itself in a position of retroflexion, and it is often necessary to correct this tendency by replacement with the sound, so as to bring the axis into a position rather of anteflexion.

A form of instrument which will sometimes retain the uterus within the vulva when no other will do so except by external support is Zwancke's pessary. This consists of two plates like butterflies' wings, hinged together, and capable of being expanded either by a screw, or by two arms which are secured by a simple catch, as in Dr. Godson's modification, which is the best form of the instrument (Fig. 46). The pessary stretches the vagina laterally, and merely re-

tains the cervix within the vulva, without tending to elevate
it to its normal level, or remedy the retroversion or retro-
flexion. It thus secures only a very partial alleviation, and
most authorities justly denounce its principle as unsound.

Some patients who have used it,
however, derive from it so much
relative comfort that they are not
easily persuaded to change it for
any other instrument. The cervix
resting upon the hinge is apt to be-
come inflamed or ulcerated, but
this effect may be obviated in great
measure if the pessary be so made
that the hinge forms no projection.
The chief advantage of the instru-
ment is that the patient can easily
remove it herself, and she should
be stringently enjoined to do so
every night. Through neglect of this precaution severe rec-
tal and vesical fistulæ have not unfrequently been produced.
On the same principle act Simpson's shelf pessary, and a
modification of this, praised by Dr. Matthews Duncan,
namely, the disk and stem pessary, the stem of which pro-
jects through the vulva, after the disk has been introduced,
like a button through a button-hole, but these are less
easily removed by the patient herself than Zwancke's pes-
sary.

The numerous old forms of pessary, which kept up the
uterus mainly by their bulk filling the vagina, such as
globes or disks of wood or other materials, have properly
fallen into disuse. One instrument, however, acting on this
principle is sometimes useful when, from the presence of a
pelvic tumor or inflammatory swelling, neither a rigid pes-
sary nor even the elastic ring can be tolerated, namely, the
air-ball pessary. This consists of a hollow spherical ball of

Fig. 46.

Zwancke's Pessary, modified
by Godson.

india-rubber. A tube is attached, through which it is inflated by means of a small air-pump, and the patient can easily introduce and remove it herself. Owing to the material used, frequent removal is necessary for the sake of cleanliness.

If the lever or elastic ring pessary cannot be retained, it is generally best, in default of a plastic operation, to resort to the cup and stem pessary (Fig. 47), supported from a waist-belt by four bands. Before it is used any ulceration present should be cured by rest. This pessary has the advantage of not stretching the vagina, and the patient will scarcely fail to remove it every night, at which time astringents may be used. The bands should be made of india-rubber

FIG. 47.
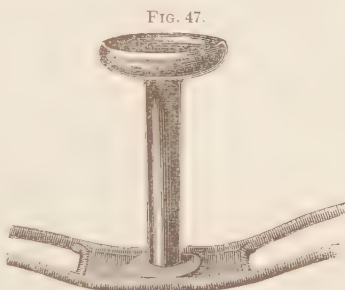
Cup and Stem Pessary.

tubing, not of uncleanly webbing, as in the instruments commonly sold, and the pessary itself of vulcanite. Its lower end should be fixed in the centre of a square sheet of india-rubber of suitable width, to the corners of which the bands are attached, so that they may not cross the labia, but lie in the groove at each side. They will then not produce chafing. The stem may have a pelvic curve if preferred, but the straight instrument better corrects the tendency to retroversion by pushing the cervix backward. Pessaries of the same shape, made in red rubber, are sometimes useful when much tenderness is present, but their material is less cleanly, and they will scarcely resist a powerful displacing force.

As an alternative to the cup and stem pessary may be used the form of Cutter's pessary, having a cup at its upper

11

extremity to receive the cervix uteri. In this the stem curves backward over the perinæum, and ends in a single band of india-rubber tubing, which passes backward and is attached to a belt (Fig. 48). This instrument is praised by Dr. Thomas as the most perfect of all those resting upon external support, but I have found it to be more liable to displacement, and more apt to cause chafing than the cup and stem pessary adjusted in the manner described.

When a patient declines operative treatment, and objects to more effectual forms of pessary, some degree of comfort may often be attained by one of the utero-abdominal sup-

Fig. 48
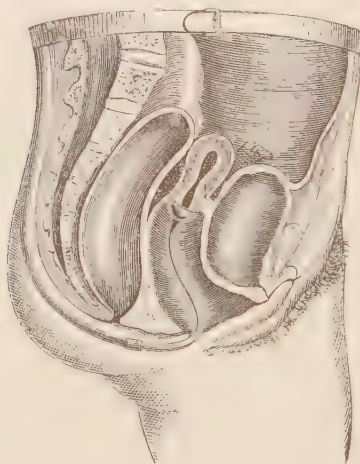
Cutter's Pessary for Prolapse, in position.—(After Thomas.)

porters, which were formerly more used than at present. These consist of a belt combined with a padded metallic plate, fitted above the pubes or over the sacrum. A strap passing between the legs supports a perineal pad, which may succeed in keeping the uterus within the vulva, while the pressure of the plate tends to relieve sympathetic pains.

Operative Treatment.—If there be hypertrophic elongation of the vaginal portion of the cervix, the elongation is probably the primary cause of the prolapse, and the only satisfactory treatment is amputation. The operation is described under the head of Hyperplasia of the Cervix (p. 145).

Since damage to the perineal body in parturition is generally the starting-point of the conversion of the vagina from a uterine support into a cause of displacement, the simplest operation for the restoration of that support is the repair of the perinæum, which may be carried out without any need for quilled sutures. If effectually performed, this will at least render the retention of a lever or elastic ring pessary possible, although by itself it usually fails to effect a cure, since the new perinæum dilates under the pressure of the descending uterus.

To secure a more permanent result, various extensions of the operation have been proposed by Baker Brown, Simon, Hegar, and others, with the object of contracting the vagina by removing a more or less considerable portion of its posterior wall. In Simon's operation, which he called *posterior colporrhaphy*, a fenestrated speculum is used—a modification of that of Sims. Through the fenestra the mucous membrane is freshened by scissors or knife over a surface 2¼ inches wide at the vaginal outlet, where the freshening is carried out upon the posterior halves of the labia majora, and extending the same distance into the vagina, narrowing slightly toward its further extremity, where it is completed by two incisions, meeting above at a very obtuse angle. The freshened surface thus forms a pentagon. Alternately deep and superficial sutures of silk are used in the vagina, and simple sutures for the perineal border. A sort of pouch is thus formed above the cicatrix, in which the cervix may be retained, instead of gradually distending the constricted portion of the vagina. The operation of Hegar, which he

calls *perinæuræsis*, is very similar, except that, to freshen the mucous membrane, he draws it down externally by a tenaculum, that he uses silver sutures, and makes the freshened surface triangular.

Other operators have preferred to narrow the anterior vaginal wall by removing a portion of mucous membrane near the cervix, an operation called *anterior colporraphy*. Marion Sims freshens by curved scissors, and brings together by silver sutures, a **V**-shaped portion, the open arms of which, directed towards the cervix, are partly united by transverse portions, leaving a pouch of mucous membrane within. Emmet prefers to close the pouch by completing the transverse portion. Schroeder freshens the whole of an oval surface, and brings it together by alternately deep and superficial sutures. Some have proposed, in the case of old women, to close the vagina at its outlet, with the exception of a small aperture, by uniting the labia majora, or to close it completely at a higher level. Le Fort recommends that a longitudinal septum should be made by uniting the anterior with the posterior vaginal wall, so as to produce an artificially duplex vagina, which he supposes not to interfere with coitus or parturition.

Choice of Operation.—After any of these operations, except complete occlusion of the vagina, however perfect the result may appear to be at first, an entire relapse is apt to take place after a considerable interval. It appears preferable, therefore, not to aim at absolute cure by the operation alone, but rather at rendering it possible for a convenient vaginal pessary of moderate size to be used effectually. The operation indicated for this purpose is the easier and less serious one, namely, that of narrowing the vagina at its lower portion posteriorly, with restoration of the perinæum. This may be carried out by a plan similar to that of Simon or Hegar, the most convenient material for the sutures being silkworm gut. This will always enable some form of lever

or elastic ring pessary to be retained, and generally a Hodge's pessary, of sigmoid shape and moderate size. If the cervix be kept by this means at its normal level for several years, any hyperplasia of the uterus may, at length, be removed, and the ligaments so recover their tone that the pessary may be permanently discarded without fear of a relapse. Such a plastic operation is generally to be recommended in the case of women not much beyond middle age, when there is so much deficiency of perinæum or relaxation of vagina that none of the forms of lever or ring pessary proves efficient, in order to save them the inconvenience of wearing for many years external supports. When even a pessary, supported externally, fails to retain the prolapse, or cannot be borne, after judicious preparatory treatment, an operation becomes the only tolerable alternative.

INVERSION OF THE UTERUS.

Pathological Anatomy.—Inversion of the uterus may exist in three stages : the first, when the fundus is only partially invaginated and remains within the os ; the second, when the fundus has passed through the os ; the third, a stage very rarely attained, in which the whole of the cervix as well as the body is completely inverted, so that not even a groove remains between the inverted cervix and the vaginal vault. Either of the two latter stages may be complicated by extrusion of the inverted fundus outside the vulva. Acute inversion of the uterus belongs rather to obstetrics, since it is generally the result of parturition. We have here to deal with the chronic stage, which may be regarded as reached, in cases occurring after delivery, when the process of involution is complete.

Causation.—The conditions necessary for the production of inversion are laxity of the uterine wall, and a force of traction or pressure applied to some part of the fundus. In the puerperal state, the force is generally that of traction

applied through the funis to an attached placenta, pressure by the external hand on a relaxed uterus, or simply the weight of the relaxed and prominent placental site, with or without the placenta itself in addition. Apart from parturition, it chiefly arises through the traction of a submucous fibroid or fibroid polypus. In either case the uterus, grasping the invaginated portion as a foreign body, is stimulated to contract, and so increase the inversion.

Results and Symptoms.—The immediate symptoms of inversion are usually severe shock and collapse, frequently accompanied by sudden and severe hæmorrhage. The uterus is felt like a foreign body in the vagina, or outside the vulva, and excites expulsive efforts. In the chronic stage menorrhagia or irregular hæmorrhage is usually a prominent symptom, and often calls imperatively for relief. The presence of the tumor gives rise to bearing down, with rectal and vesical tenesmus, and frequently it becomes difficult or impossible to retain it within the vagina. The uterine mucous membrane becomes inflamed from the irritation to which it is exposed in its unnatural situation, and thus arises muco-purulent leucorrhœa. If the tumor be protruded externally ulceration is likely to be produced, and even sloughing may occur. Death may result from sloughing, from hæmorrhage, or from gradual exhaustion. In some cases adhesion arises between the peritoneal surfaces of the uterus, but this is very rarely found, even when the difficulty of reduction has been extreme. Inversion may sometimes persist for years, with but slight symptoms, but this is usually found only in those instances in which, after the menopause, toleration has become established and the structure of the uterine mucous membrane has been profoundly altered. In very rare cases spontaneous replacement has occurred, even after a long interval, and it is not uncommon to find reduction spontaneously completed after it has been commenced by art.

Diagnosis.—The tumor formed by the inverted uterus will be found externally or felt by the finger in the vagina. The most essential point in diagnosis is to distinguish between inversion of the uterus and polypus, as well as to discriminate the case in which a polypus has produced by traction a partial inversion. In the case of polypus the fundus may be made out on bimanual examination, the finger being introduced into either vagina or rectum, while in inversion it is absent from its normal place. The readiest mode of distinction is the use of the sound, which in inversion is arrested at less than the normal length, when passed up between the base of the tumor and the os, but in the case of polypus passes to the full length, or generally to a greater distance. In rare cases the surface of a polypus may become adherent to the edge of the os at all points, but the sound can almost always be forced through at some part without excessive pressure. The surface of the inverted uterus, unless modified by long exposure, is highly injected, velvety, and readily bleeds. It is also distinguished from a polypus by being painful, and sensitive to acupuncture, or the tightening of a ligature or écraseur wire. A crucial test is to pass a female sound into the bladder with the point directed backward. If a finger be introduced into the rectum the point of the sound can then, in the case of inversion, be felt above the os, with only the walls of rectum and bladder intervening, at the point which would otherwise be occupied by the body of the uterus. In some cases the funnel-shaped depression formed by the inversion can be felt from the rectum.

Treatment.—In recent cases arising independently of parturition, as well as in those resulting from labor, reduction may be effected by taxis. The patient should be placed under an anæsthetic, and the hand passed into the vagina so as to compress the tumor and make steady and prolonged pressure upwards in the direction of the pelvic axis, while

the other hand makes counter-pressure upon the abdomen. The effort should be to return first the part last inverted, not to indent the fundus, the effect of which would be to double the thickness of uterine wall to be passed through the constriction. If the inversion is chronic there is considerable risk of producing laceration by attempting to reduce it immediately by forcible taxis, and it is preferable to commence by the method of prolonged elastic pressure. If this fail to complete the reduction taxis may then be tried, and repeated, from time to time, elastic pressure being continued in the intervals. In easy cases an air-ball pessary in the vagina, supported by a perineal bandage, may effect reduction. In a more difficult one a repositor should be used, either straight, or having a compensating perineal, as well as a pelvic curve, as in the instrument of Dr. Aveling. In the early stage of reduction of a complete or nearly complete inversion, when the uterine axis is likely to lie nearly in the line of the vagina, the straight repositor will answer well, but when the restoration is partially effected the doubly-curved repositor appears to afford a great advantage, allowing pressure to be made in the axis of the pelvic brim.

The repositor should be fitted with at least two terminals of different sizes, to be screwed on to its upper extremity ; first, a cup-shaped disk large enough to receive the inverted fundus, for use in the earlier stage of reduction ; secondly, a smaller disk, which may pass through the os, when the fundus has been once reduced inside it, and so complete the restoration. To the lower end of the repositor are fixed four elastic bands, to be attached before and behind to a waist-belt. By the adjustment of these the direction and force of pressure may be regulated. The patient should remain in bed, and morphia injections should be given, if necessary, to enable the pressure to be tolerated. In the absence of a repositor made for the purpose, a fairly effective substitute for the earlier stage of reduction may be extemporized by

cementing a small half-expanded air-ball, or a small india-rubber disk pessary on the summit either of a straight cup and stem pessary (Fig. 47), or of Cutter's prolapse pessary (Fig. 48), the latter of which gives the advantage of the double curve. The later stage of reduction may then be completed by taxis.

There are several stages of reduction at which impediments may arise, and special expedients be required to overcome it. Resistance may be offered at first by the constriction of the external os. This may be overcome by the plan of Dr. Hicks, namely, to distend the vaginal vault by a hollow annular elastic pessary, used in conjunction with direct pressure on the fundus, so as to stretch open the os ; or by that of Dr. Barnes, namely, to incise the edges of the os. The former would generally be preferable. More frequently the point of constriction which causes most difficulty is near the internal os. If other means fail the expedient recommended by Barnes and Marion Sims may be employed, namely, to make two longitudinal incisions through the muscular fibres beneath the mucous membrane before applying taxis. This measure involves a risk of considerable hæmorrhage and of extension of laceration. It should scarcely be adopted until full trial has been given to the doubly-curved repositor. When the reduction has been more than half completed, but the actual fundus resists restoration, the mode of taxis proposed by Dr. Noeggerath, of New York, and found successful also by others, should be tried, namely, to make pressure with one finger upon one horn of the uterus, about the point of exit of the Fallopian tube.

If all means of reduction fail, there remains the extreme resort of amputation of the inverted organ. In future this will rarely be justifiable, and reduction will probably always be possible except in the very exceptional cases of firm adhesion between the peritoneal surfaces, in which case the risk in amputation is greatly lessened. Amputation should

be performed by the galvanic écraseur, or, failing this, by the ordinary wire écraseur, an actual cautery being at hand to restrain hæmorrhage, if required. The tumor should first be drawn down, and a strong ligature passed through it above the line of amputation, in order to secure full command of the stump.

Dr. Thomas has boldly carried out the plan of opening the abdomen, in order to dilate the constricted cervix from above, and so effect reduction. Of two patients so treated, one died and the other had a narrow escape of death. The method thus appears at present to be too dangerous for imitation.

CHAPTER V.

HYPERPLASIA AND ATROPHY OF THE UTERUS.

SUBINVOLUTION, HYPERTROPHY, AND HYPERPLASIA OF THE UTERUS.

Causation.—Of all organs of the body, the uterus is that the tissue of which responds most readily by change of nutrition to any alteration in its vascular supply, or to any form of stimulus whatever. This quality is necessary to render it capable of growing during pregnancy from a weight of about $1\frac{1}{4}$ to one of about 28 ounces, and of being restored almost to its original size during about six weeks after delivery. Moreover, during the years of active sexual life it is never at rest, even apart from pregnancy, and its mucous membrane passes through alternations of growth, swelling, and exfoliation, in each menstrual cycle, accompanied by corresponding changes in the vascular conditions of the whole organ. Modifications in these changes are apt to be associated with hypertrophy, degeneration, or atrophy of its tissue.

Like any other hollow, muscular organ, the uterus undergoes hypertrophy if any obstacle exists to the expulsion of its contents. Enlargement may thus be produced by stenosis or flexion. The most frequent cause, however, of enlargement of the uterus is subinvolution, or a failure to undergo a sufficient reduction in size after delivery or abortion. For the proper performance of involution two conditions are necessary; first, a suitable diminution of the quantity of blood in the uterine vessels and of the blood-stream through them; secondly, a sufficient activity in the

process of absorption and nutrition. The former is largely dependent both upon the periodical contraction of the uterus and upon the tone of its muscle during the intervals of rhythmic contraction. Subinvolution is thus promoted by muscular atony, and also by a failure to perform the function of lactation, since the suckling of the child by reflex action stimulates the uterus to contract. Other important causes of active hyperæmia and consequent subinvolution are retention of a portion of placenta, membrane, or clots, and inflammatory conditions of the cervix or body of the uterus or of neighboring tissue, the commonest of these being the effects of mechanical injury to the cervix during labor. A too early return to the upright posture, to muscular exertion, or to marital intercourse has the same effect. On the other hand, a too prolonged and absolute maintenance of the dorsal position tends to passive hyperæmia, and so renders involution imperfect. An important cause of passive hyperæmia is the partial prolapse or other displacement which often arises after parturition, especially in consequence of a too early getting-up. Any local or general cause of venous obstruction tends to the same effect.

After abortion subinvolution is still more frequent than after delivery ; first, because the uterine mucous membrane, not being naturally prepared for the separation of the decidua, and in many cases having been previously diseased, is more apt to be left in an abnormal condition, or with a portion of placenta still adhering ; secondly, because the stimulus of lactation is wanting ; and, thirdly, because women, underestimating the importance of abortion, are more apt to neglect the precaution of resting for a sufficient time, and to return too soon to matrimonial intercourse. After either delivery or abortion deficiency of absorption may arise from constitutional debility or malnutrition.

Apart from pregnancy, the main cause of uterine enlargement is active or arterial hyperæmia, either reflex or

associated with inflammation ; but passive or venous hyperæmia also tends to cause the tissue to become infiltrated with serum, and eventually to produce overgrowth with degeneration. The causes of active and passive hyperæmia will be considered hereafter (see pp. 150–156). According to Dr. Thomas a uterus which has once been enlarged by the stimulus of pregnancy is afterwards far more prone than the nulliparous uterus to undergo a process of hyperplasia under the influence of any inflammatory or other exciting cause.

Pathological Anatomy.—In enlargement of the uterus the result solely of obstructed outflow, the pathological condition is that of hypertrophy of the whole organ, but more especially of the muscular fibres. The muscular structure may also be hypertrophied equally with the cellular tissue in the earlier stages of a subinvolution which has arisen without the existence of any metritis, either as a cause or complication. In the great majority of cases, however, of subinvolution and other forms of enlargement, microscopic examination shows an undue proportion of fibrous tissue compared with muscular fibre. This leads at length to an induration of the tissue, which, in the early stage, was softer than normal from infiltration with serum. In the cervix especially this induration is manifest to the finger, and may lead to an erroneous diagnosis of scirrhous cancer, an error which formerly was probably often made. As might be expected from the well-known tendency of chronic inflammation to lead to induration by the production of fibrous tissue, this relative increase of cellular, as compared with muscular elements, is greatest when chronic metritis, whether of body or cervix of the uterus, is the cause of enlargement, and, in mixed cases, it is more marked in proportion to the preponderance of the inflammatory element. It may, however, be a degenerative change under the influence of venous stagnation, or due to constitutional causes of degeneration of tissue. The anatomical state finally reached,

which has been variously called areolar hyperplasia, sclerosis of the uterus, or congestive hypertrophy, may thus be brought about by different causes, either by a chronic inflammatory process, or by conditions in which there is no proof of inflammation as commonly defined. Whichever name be chosen, therefore, should be reserved for the result produced, and not applied to the process leading up to it. The increase in thickness of the uterine walls is commonly greater in proportion than that of the length of its cavity, so that, apart from cases of descent and tensile elongation of the cervix, the organ assumes a more globular form. The cavity of the uterus, as measured by the sound, is usually not longer than $3\frac{1}{2}$ or 4 inches, though sometimes it is increased to as much as 5 inches, or even more.

Varieties.—In most cases the hyperplasia affects both the body and neck of the uterus, though it commonly preponderates in one or the other of these, and may be confined to one portion alone. Among special forms of hyperplasia is hypertrophic elongation of supravaginal cervix. This is generally due, in the main, to the tension of the vaginal wall or prolapsed cervix, associated or not with causes of hyperplasia, either primary or consequent upon the prolapse, and it has been discussed under the head of prolapse of the uterus and vagina. Another form is hyperplastic elongation of the vaginal portion of the cervix, to be distinguished from hyperplasia affecting the cervix in its breadth, or in all its dimensions. This is a comparatively rare affection, and is more usually found in virgins or nulliparous women, being apparently in some measure a congenital condition. It generally leads to prolapse of the first or second degree, and the prolapsed cervix then becomes congested or inflamed, and the hyperplasia is thereby increased.

Results and Symptoms.—Enlargement of the uterus is a very common cause of displacement, especially of prolapse, retroversion, or retroflexion, in consequence of the increase

of weight and the softness of tissue which generally exists in the early stage. Uncomplicated hyperplasia, especially when recent, is liable to cause dragging pain in the back, hypogastrium, and loins, from the increased strain upon the ligaments. Increase of surface in the uterine cavity natu_ rally leads to an increased menstrual flow, except in the late stages of hyperplasia, when the tissue is degenerated and anæmic. In the early stage of subinvolution after delivery there is generally sufficient associated hyperæmia to lead to the recurrence of menstruation at an early period, notwithstanding the opposing influence of lactation. The remaining symptoms of hyperplasia are due for the most part to the hyperæmia, endometritis, metritis, or displacement, with one or more of which it is almost always associated.

Diagnosis.—Hyperplasia of the cervix is readily detected by vaginal touch, and its stage is indicated by the hardness or softness of the tissue. The differential diagnosis from cancerous degeneration is described under the head of cancer. In hyperplasia of the body of the uterus, the enlargement is detected by the bimanual examination, and the thickening of the walls is generally found to be greater than the increase in length. The length of the cavity is revealed by the sound, if its use be not contraindicated. The most difficult point in diagnosis is to distinguish between simple hyperplasia and enlargement due to a fibroid tumor. In the latter case, the external surface of the uterus is often felt to be irregular. If, however, the tumor bulges internally, it may be necessary to dilate the cervix before the unequal enlargement can be detected. In cases in which the presence of a very small fibroid causes great hyperplasia of the whole uterus, the tumor is especially liable to escape recognition. From early pregnancy hyperplasia is usually distinguished by the greater sensitiveness of the uterus, and by the persistence of menstruation, whereas, in pregnancy, there has usually been amenorrhœa

at some period, though hæmorrhage may be present when abortion is threatening. This distinction, however, may fail in the case of hyperplasia associated with the commencement of climacteric irregularities. The most valuable sign by which to distinguish the pregnant uterus is the more globular enlargement of its body as felt bimanually, and its greater softness and indistinctness, due to the chiefly fluid nature of its contents. Variation in the consistence of the uterus, due to the alternation of contraction and relaxation, may often be detected early in pregnancy, and is a very valuable sign if it exists, since it is far more marked in pregnancy than in any other uterine enlargement. In molar pregnancy, however, the uterus may never be soft or flaccid. Softening of the cervix is an important sign, if present, but it is often absent in the early stage of pregnancy in a multipara.

Treatment.—(1.) *Prophylactic.*—The most important part of prophylactic treatment consists in the judicious management of the puerperal state and of abortion, in which should be included the utmost care to avoid causes of septic or traumatic inflammation. Rest for a due period, mainly in the horizontal position, should be observed, but a too continuous maintenance of the dorsal position, especially on a soft bed, should be avoided, as tending to cause venous stagnation and retain discharges. The child should be suckled, if possible, for at least from four to six weeks, even if the mother's milk requires to be supplemented. It would be of advantage if, in all cases, at the end of the puerperal period an examination could be made to ascertain that no displacement had arisen, or lesion of cervix remained. Whenever sanguineous or muco-purulent discharge continues too long after delivery, such an examination should not be omitted. After abortion in the early months, rest, more or less complete, and abstinence from coitus for as much as four weeks should be enjoined. After miscar-

riages between the third and sixth months much more prolonged rest and care is usually called for than after normal delivery at full term. It is also of essential importance in the immediate treatment of abortion to secure the complete evacuation of the uterus. After abortion, and also in the case of failure of lactation after delivery, it is desirable to administer a course of ergot for several weeks to promote uterine contraction.

(2.) *Curative.*—In the earlier stages of hyperplasia a cure may result from the removal of its cause. Thus, in cases of subinvolution within a few months after delivery, great good is effected by remedying displacement, by curing cervical inflammation—one of the commonest causes which interfere with the normal process of involution—and by treating hyperæmia by suitable means. It is also of importance to remedy any constitutional debility or anæmia, which often accompanies lactation, and by which the activity of absorption may be impaired. For this purpose the most valuable drugs are iron, quinine, and strychnia.

In the case of enlargement of the uterus associated with hæmorrhage within a few months after abortion, the choice of treatment depends upon the question whether the subinvolution and hæmorrhage are common results of a piece of placenta remaining attached within the uterus. This will generally be found to be the case if the hæmorrhage has proved so severe as to produce marked anæmia; and the probability is increased if the cervix is found to remain unduly open. In some cases even the internal os may remain so much open as to admit the finger and allow it to detect the foreign body within. If it does not fully admit the finger it should first be dilated with one or more tents. For evacuating the uterus the finger is the best instrument. The necessity for giving an anæsthetic will depend upon the capacity of the vagina and the toleration of the patient. It is essential that the bladder should be completely emptied,

for this allows the fundus to be brought much more easily under command of the external hand. The patient being in the dorsal position, the index finger alone is to be passed into the uterus, while the half hand is introduced into the vagina, the remaining four fingers being flexed upon the palm. The other hand is placed upon the abdomen, and its ulnar edge pressed in above the fundus so as to bring it close to the pubes. The uterus can then be pressed down so that unless the uterine cavity is excessively lengthened, the finger can reach completely up to the fundus, without the necessity of passing the whole hand into the vagina. If the uterus is at all retroverted, the finger introduced into the cervix may conveniently be used as a repositor, to bring it into a position of slight anteversion. It is very rarely that any other instrument than the finger is required. In some cases, however, a pair of forceps with flat serrated blades locking closely together may be useful to remove a piece of tissue which has been wholly or partially detached. After the operation full doses of ergot should be administered for a time, and complete rest enjoined. Antiseptic vaginal injections should be used, and, if any offensive discharge should appear, or febrile symptoms arise, the uterus itself should be syringed out with a weak solution of carbolic acid or iodine.

When the cervix is closed, and the hæmorrhage not serious in quantity, there is a probability that the case may be one of simple subinvolution. The effect of treatment by rest and the administration of ergot and other uterine styptics should then first be tried. If hæmorrhage cannot be permanently checked by this means, the cervix should be dilated for exploration of the uterine cavity.

In the case of hæmorrhage persisting after delivery at full term, the treatment should be conducted on the same principles. The retention of some portion of placenta, membranes, or clot, must be regarded as a not improbable

contingency, even though it may have appeared certain that the placenta and membranes came away intact.

The later stage of fibroid induration is little susceptible to treatment, and is scarcely, if at all, affected by absorbents, such as mercury or iodide of potassium. A degree of tolerable comfort may, however, frequently be obtained by treating the coincident hyperæmia, or displacement, though a tendency to relapse commonly remains. It is only in exceptional cases, and after fair trial of such means, that it is desirable to have recourse to the more surgical modes of treatment to be hereafter mentioned. The most powerful of all influences in diminishing the size of the uterus is the involution after delivery, during which even fibroid tumors may sometimes disappear. All means should therefore be taken by curing endometritis, and relieving any flexion or stenosis of the cervix, for removing the sterility which commonly accompanies the late stage of hyperplasia.

A process somewhat analogous to involution may also be induced by the more powerful local remedies sometimes used for endometritis, such as strong carbolic or nitric acid introduced into the uterine cavity, and their occasional beneficial influence on the size of the uterus may be thus in part explained. A transient inflammatory hyperæmia is set up, on the subsidence of which the blood supply is contracted, and absorption becomes more active. A similar effect may result from local applications to the cervix, and thus hyperplasia associated with erosion of the cervix is sometimes more amenable to treatment than when erosion is absent. When there is no erosion a beneficial effect may sometimes be produced by making an artificial eschar upon the cervix either by heat or by caustics. This acts most upon the cervix itself, but the body of the uterus also partakes in the nutritive changes set up.

For the application of heat Paquelin's benzoline cautery is the most convenient means, but the galvanic cautery, or

cautery irons, of the size of a small button, may also be used. It is best to employ a speculum of wood or horn for this operation, but a large cylindrical metal speculum may be used if care be taken that it does not become overheated.

The application should be made to the outer part of the cervix, to avoid subsequent contraction of the cervical canal. The potential cautery has the convenience that it does not require the presence of an assistant. The best, in most cases, is the potassa fusa cum calce. This is less superficial than nitric or chromic acid, while its action is more easily limited than that of potassa fusa or chloride of zinc. The cervix should be brought completely into the field of a cylindrical speculum and wiped dry. A dossil of cotton-wool, soaked in vinegar and squeezed nearly dry, should be tucked beneath the cervix at the lower part of the speculum. A stick of the potassa fusa cum calce is then fixed in a long caustic-holder and rubbed several times, for not more than a minute at each application, over a surface about the size of a sixpence, on one or both lips of the cervix away from the cervical canal. A larger tampon, soaked in vinegar, should then be applied.

Potassa fusa causes a deeper destruction of tissue, and should be used with much caution, if employed, since a too vigorous application may cause serious inflammation. It is also more liable to run on to the vaginal walls. Chloride of zinc, made into sticks, is also sometimes used to cauterize the cervix. It is a powerful and rather painful form of caustic. In its use the vagina must be protected by an alkaline solution. Dr. Tilt recommends that some days before application of potassa fusa cum calce or chloride of zinc, the spot should be rubbed repeatedly with solid nitrate of silver to soften the epithelium. A second or subsequent repetition of the cauterization may be called for if the first has only a superficial effect. Such a prolonged treatment is specially applicable to the case of a localized induration of

one lip of the cervix. When hyperplasia affects the vaginal cervix and increases it in length as well as breadth, an efficacious treatment is to amputate a portion by the galvanic écraseur, by which means not only is superficial tissue removed, but the alterative influence of the cautery is brought to bear upon the whole uterus. In the absence of the galvanic cautery the cervix may be cut through with scissors, the actual cautery being used to stop bleeding if necessary. After amputation of tissue or the application of cautery or caustic by any of these methods, the patient should be kept in bed for at least a week, and tampons soaked in half an ounce or more of glycerin kept applied to the cervix. Discharge is thereby promoted and the influence of the local inflammation and reparative action on the nutrition of the whole organ is increased.

Another mode of inducing an altered nutrition in cases of chronic induration, especially as affecting the cervix, is to introduce a succession of sponge tents at intervals of some days. The effect of these is to soften the tissue and produce a copious watery discharge for the time. Sir James Simpson recommended, in some cases, the use of an intra-uterine stem for a limited time, for the sake of the revulsive effect, in some degree analogous to involution, which follows upon its withdrawal.

Treatment of Hyperplasia of the Vaginal Cervix.—Elongation of the vaginal, unlike that of the supravaginal, cervix, is commonly, in the main, a primary affection, the cause rather than the consequence of prolapse, and hence the only satisfactory treatment is the removal of the redundant portion. The only difficulty of the operation is that of dealing with the haemorrhage, which is apt to be considerable, especially when the tissue is soft, while the arteries cannot easily be secured by ligature or torsion. The easiest and quickest mode of amputation is that by the galvanic écraseur. To avoid the risk of opening the bladder or perito-
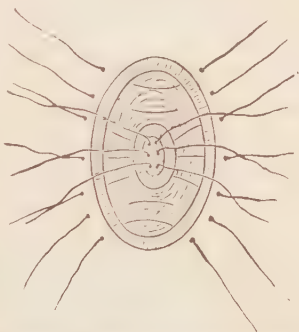
neal cavity, the sound should be passed into the bladder to
ascertain the exact limit to which it extends, and the uterus,
if prolapsed, should be returned to its place before the wire
is adjusted. The stem of the écraseur is then carried up in front
of the cervix, and the loop adjusted by the finger passed up
into the posterior cul-de-sac, without the use of a speculum.
To secure arrest of hæmorrhage the wire must be tightened
slowly. After removal of the vaginal portion, a sound
should be passed into the cervical canal to make sure that
its lips are not glued together, and a large bougie should
be passed at intervals for some time after the operation to
counteract the gradual contraction which is apt to occur
after the use of the cautery. If the tendency to contract be
strong, an expanding stem pessary (see p. 107) may be worn
for some months.

In the absence of the galvanic cautery, the ordinary
écraseur (Fig. 53) may be employed, but in its use there is
a greater risk of lacerating bladder or peritoneum, in con-
sequence of the extreme tension produced when the tissues
are tough. It is a good plan to make an incision with a
knife through the mucous membrane around the cervix at
the level at which the wire is to be adjusted. A twisted
rope, composed of several strands of steel wire, should be
used, and fixed at one end only to the moving portion of the
écraseur, so that a sawlike motion may be brought into play.

The cervix may also be amputated by knife or scissors,
and the hæmorrhage checked by actual cautery, or by the
plan introduced by Dr. Marion Sims, namely, to unite the
mucous membrane over the stump by sutures, and so arrest
the bleeding by pressure. By this the advantage is gained
that primary union may be procured, and the patient is then
saved from the necessity of protracted suppuration and cic-
atrization of the stump. The resulting cervix is, therefore,
more nearly of a normal character, and gradual contraction
of the cervical canal does not occur. The operation may

be carried out with the uterus in place by means of Sims's speculum, but is then rather tedious and troublesome. When the cervix can be drawn down externally, without much force, as is generally the case under these circumstances, it is a very easy one. I have usually performed it in the following manner : The cervix having been drawn outside the vulva by tenaculum forceps, and the lowest point of the bladder ascertained by the sound, a strong hare-lip pin is passed through the cervix from before backward, about a quarter of an inch below this point, and another similar pin at right angles to the first. A piece of thin india-rubber tubing is then passed twice round above the pins and tied tight enough to prevent bleeding. The cervix is then cut across transversely with scissors below the pins. The incisions may be so made that the mucous membrane is left longer anteriorly and posteriorly, but it is unnecessary to dissect off flaps, since sufficient mucous membrane to cover

the stump can be obtained by pulling it down. Scissors are preferable to the knife as causing less hæmorrhage. Sutures of silver wire are applied in the manner shown in Fig. 49 ; two at each side of the cervical canal, to unite the mucous membrane at front and back, and from one to three intermediate sutures to unite the outer mucous membrane to that of the cervical canal. All these should be passed deeply enough to include somewhat more tis-

FIG. 49.

Mode of placing sutures after amputation of the vaginal cervix.—(After Schrœder.)

sue than the mere mucous membrane. The elastic constrictor is then unfastened to allow the mucous membrane to come together and the sutures tightened. If the bleeding con-

tinues, or the flaps are not applied closely enough to the stump, one or more deep sutures at each side may be passed through the whole thickness of the cervix at points intermediate to the more superficial sutures.

Of these modes of operating the use of the galvanic cautery is the easiest, and is always preferable if the cervix cannot be drawn down. Dr. Marion Sims's mode of performing the plastic operation was merely to unite the mucous membrane at front and back, without passing any suture into the cervical canal, but the method above described has the advantage of keeping the cervical canal thoroughly open.

SUPERINVOLUTION AND ATROPHY OF THE UTERUS.

The process of involution may be excessive, although this fault is very far more rare than the opposite, and instances have even been recorded in which the uterus has been so reduced in size after parturition that its presence could not be detected. Such atrophy may occur after normal delivery in ill-nourished women, who have a tendency to premature decay, or it may be the result of general or local puerperal disease. Atrophy of the uterus may also arise gradually in ill-nourished subjects, apart from parturition, and may lead to a premature menopause. There is a greater tendency to this in women in whom ovarian activity has throughout life been below par. Senile atrophy is a normal condition after the menopause, but does not usually proceed to a considerable extent till after the age of sixty. The vaginal portion and os then become especially small, and not unfrequently stenosis or even occlusion of the cervical canal occurs. The vagina shares in the atrophy, and becomes funnel-shaped, while the external generative organs also waste.

Results and Symptoms.—The symptoms of premature

atrophy of the uterus are scanty menstruation or amenor-rhœa and sterility.

Treatment.—In many cases it is preferable not to interfere unless there are symptoms of unrelieved ovarian molimen, or the patient is anxious for treatment. Otherwise, if the natural period of the menopause has not been nearly reached, and atrophy is not extreme, stimulant treatment may be directed to the uterus, in the shape of tents used at intervals, or galvanic or other intrauterine stems, as described under the head of Amenorrhœa, while the Faradic or galvanic current may be used as an adjuvant. The same general and hygienic treatment as in the case of primary failure of development (p. 49) should be added. Treatment must be long protracted, often for as much as one, two, or more years.

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CHAPTER VI.

HYPERÆMIA AND INFLAMMATION OF THE UTERUS.

ACTIVE HYPERÆMIA OF THE UTERUS.

As the uterine tissue is more prone than any other in the body to respond to stimuli by a change in its nutrition, so the uterus is most of all organs liable to physiological active hyperæmia, which readily passes into a morbid excess. Thus, hyperæmia occurs at each menstrual cycle, both during the period itself, and during the stage of growth and intumescence of the uterine mucous membrane which immediately precedes it. The tissue of the uterus and that around it are also, in a measure, erectile, and a more intense and transient hyperæmia thus arises through arterial dilatation under the influence of coitus or sexual excitement. To such forms of transient hyperæmia the term of fluxion has been applied. While in the healthy uterus they are innocuous, they may become, in morbid conditions, serious sources of mischief.

The same susceptibility of the uterine vascular system to stimulus leads to a more chronic active hyperæmia, as the result of any source of reflex irritation. This may arise from any morbid condition or undue activity of the ovaries, from inflammation or other lesion of the cervix, or from more distant sources, as inflammation of the vagina or vulva, from sensitive caruncles of the urethra, or even from pruritus vulvæ. Again, a fibroid or cancerous growth in one part of the uterus causes hyperæmia and consequent enlargement of the whole, and the same result may be produced by a

neighboring cellulitis or peritonitis.   The persistent excess
of vascular pressure leads to swelling of the tissue by effusion
of serum, and eventually to hypertrophy.   The pressure upon
the nerves consequent upon swelling may lead, in persons of
acute sensibility, to tenderness and pain, such as in them
may be produced also by the fluxion of menstruation.   Thus
many of the conditions usually associated with inflamma-
tion may be present, while it cannot be proved that positive
inflammation exists.

The fact of the hyperæmia being produced solely by reflex
nervous influence does not, however, prove that it is not as-
sociated with a condition which partakes of the nature of
inflammation.   This is shown by the inflammations which
may be produced over the field of distribution of a nerve
by an injury to, or disease of, its trunk, as well as by the
common phenomenon of catarrh or other forms of inflam-
mation produced by the effect of cold.   In the case of the
uterus itself it is demonstrated by an occurrence which occa-
sionally happens.   There are some women so susceptible
that the mere careful use of the uterine sound by a skilled
hand may set up not only uterine but periuterine inflam-
mation, the existence of which is made certain by the effu-
sion and fixation produced.   As there may be here no op-
portunity for septic absorption, and no perceptible injury
to the mucous membrane, the case is clearly one of not
merely hyperæmia but actual inflammation, produced by an
impression upon the nerves.   It can scarcely be doubted
that, in such cases, some reflex influence is transmitted not
only to vasomotor, but to trophic nerves.   It must therefore
be admitted that from reflex nerve stimulus an indefinite
gradation may arise, from simple arterial dilatation up to
undoubted inflammation.

The uterus has also an anatomical peculiarity which brings
chronic hyperæmia of its tissue, when induced as the reflex
effect of endometritis, into close relation with chronic paren-

chymatous inflammation. Most mucous membranes are separated from the structures lying beneath them by a layer of loose areolar tissue ; and, in such case, catarrhal inflammation of mucous membrane may exist without any perceptible implication of the muscular walls beneath, as is found to be the case in such mucous membranes as that of the intestines or of the air-passages. The mucous membrane of the uterus, however, is itself of a dense character, consisting mainly of closely packed round or slightly elongated cells, and is intimately connected with the muscular wall, without any intervening loose layer. The extremities of the glands even dip more or less into the muscular layer ; and it has been maintained, with much probability, by Dr. John Williams, that a considerable proportion of the thickness of the uterine wall really corresponds in development to the muscularis mucosæ, though in the human subject no line of demarcation can be traced. We may conclude, therefore, on anatomical grounds, that, if endometritis exist, the inflammation is not likely to be strictly limited to the mucous membrane, but will affect the uterine walls to some depth. The case may be compared to that of a sore and inflamed spot on the tongue, or on any sensitive surface, which gives rise to redness, swelling, throbbing, tenderness, and pain over a considerable region in its neighborhood. The hyperæmia may be due mainly to reflex nerve irritation, but there is a zone of inflammation of lower degree, arising by continuity of tissue around the inflamed point, through which there is a gradation from simple hyperæmia up to the more acute inflammation.

The relation between mere engorgement and inflammation of the uterus has given rise to more divergence of opinion than any other in gynæcological pathology. Some distinguished authorities have omitted chronic metritis entirely from their nosology, while others, and the more numerous, have regarded it, as I believe with greater accu-

racy, as one of the commonest of the special diseases of women. The difference is fortunately not so much with regard to the true nature of the condition present, or its treatment, but rather as to the question of definition—within what limits the word inflammation is applicable. The strongest argument for the view that, in most cases of hyperplasia of the body or cervix of the uterus, chronic parenchymatous inflammation plays some part, appears to be the fact, universally acknowledged, that in the later stages there is almost invariably an increase of areolar at the expense of muscular tissue, and eventually fibroid induration. In most cases we may find at some stage the old-fashioned surgical criteria of inflammation, namely, pain, redness, swelling, and, if not heat, at any rate the arterial hyperæmia which, on the surface of the body, produces local heat. To these are added a cell proliferation, not leading, as in acute inflammation, to unstable products, but to products of a lower grade than the normal tissue of the part. This occurs even when there is no cause of passive hyperæmia, and no constitutional tendency to degeneration or sclerosis of the organs ; whereas we might expect that, if the condition were solely one of active hyperæmia, the result would be true hypertrophy, such as occurs under the stimulus of pregnancy. Such a production of fibroid tissue is a characteristic result of chronic inflammation in other organs, as the lungs, liver, or kidneys, although in them also the distinction of inflammatory from degenerative changes has been the subject of much divergence of opinion.

Treatment.—The first effort should be to remove the inflammation which active hyperæmia reveals, or the cause which sets it up by reflex action. Of such causes the most common are ovarian irritation, and erosions, fissures, or other lesions of the cervix. Of internal remedies which have a direct influence upon hyperæmia the most powerful is ergot, which acts in some measure by contracting the

arteries, but in the main by its influence upon the muscular walls of the uterus. Half-drachm doses of the liquid extract of ergot, or of Richardson's liquor secalis ammoniatus may be given three times a day in chronic hyperæmia, especially if associated with menorrhagia or metrorrhagia. A similar influence, though in less degree, appears to be exerted by digitalis and strychnia, and these may often be usefully combined with ergot, while the general tonic effects of strychnia are at the same time valuable. Bromide of potassium, while acting as a general vascular and nervous sedative, has a special influence on the pelvic organs, which depends, in part at any rate, upon its effect as a sexual sedative, in which respect it is more trustworthy than any other drug. It may be given in doses of twenty or thirty grains, combined with ergot or not. Its supposed general depressant effect upon the system is not much to be dreaded, especially if a tonic be given in combination, but in susceptible subjects it is apt to produce the bromic acne. The bromides, however, tend to diminish the quantity of the menstrual flow and lengthen the intervals, and therefore do not act so well in hyperæmia from suppression of menses, or associated with scanty menstruation. In some cases of the latter, however, they may be beneficial when given in combination with iron. Bromide of ammonium and hydrobromic acid appear to have a similar effect to bromide of potassium, although Binz has maintained that the virtue lies in the potash and not in the bromine, and that chlorate of potash is equally efficacious. Iodide of potassium is especially useful in hyperæmia dependent upon ovarian enlargement or irritation, and in such cases it is desirable to combine it with the bromide. In all cases of hyperæmia diet should be unstimulating, and alcohol should be avoided or taken sparingly.

Local Depletion.—Local depletion often gives great relief both in active and passive hyperæmia, and also in a combi-

nation of the two, especially when the hyperæmia is a sign of inflammation, or much local pain and tenderness exist. It may be performed either by puncturing, or scarification, or by leeches. The former is the most convenient, and is generally to be preferred in the earlier stages of hyperæmia or metritis, while the uterus is soft. It has the advantage that it is not liable, like the suction of a small quantity of blood by leeches, to set up a renewed fluxion to the part affected. A cylindrical speculum should be used, and two or three punctures made with a sharp-pointed bistoury, spear-headed scarificator, or triangular needle held in a pair of forceps. A sponge wrung out of hot water may afterwards be passed occasionally over the cervix to prevent clotting in the mouths of the vessels. One or two ounces of blood should be abstracted and additional punctures may be made, if necessary, till this amount is obtained. Dr. Thomas recommends that if sufficient flow does not take place from one or two punctures the cervix should be dry-cupped before puncturing by a cylindrical exhauster of vulcanite passed through the speculum.

The cases for which leeches are more applicable are those in which it is difficult to obtain sufficient blood by puncturing, as is usually the case in the later stages of hyperplasia of the cervix, and also those in which there is suppression of menstruation or too scanty a flow, so that it is advantageous to excite some temporary fluxion to the uterus. The cervix should be brought into the field of a large cylindrical speculum and the os plugged with a small piece of cotton-wool to which a thread is attached for its removal. If this precaution be neglected a leech may bite within the cervical canal, or crawl into the uterus and cause severe pain, although, in such a case, it is usually expelled after a time without very serious damage resulting. The cervix is first to be thoroughly cleaned, and may be scarified to draw a few drops of blood. Three or four leeches

should then be placed in the speculum, its lower extremity closed by a plug of cotton-wool, and the speculum watched till the leeches have ceased sucking. Single leeches may also be applied by a long glass tube provided with a piston, or by leech forceps. In case of excessive bleeding after removal of the leeches, a plug of cotton-wool soaked in perchloride of iron may be applied to the cervix.

Local depletion may be performed in the consulting-room or hospital out-patient room, but it is preferable that the patient should remain at rest in bed for some hours afterwards, especially if leeches be used. Several repetitions of puncturing or leeching are generally required at intervals of ten days or a fortnight. Neither should be performed within five or six days before a menstrual period is due, otherwise its recurrence is apt to be interfered with. If, however, menstruation is scanty, and an increase of congestive pain occurs at its cessation, depletion immediately after the flow often gives relief.

A very convenient mode of causing a flow of copious secretion from the cervix and vagina, and so depleting their vessels, is the use of strong glycerin, by which the need for withdrawing blood may often be avoided. A tampon of cotton-wool is to be thoroughly soaked in from half an ounce to an ounce of glycerin, and passed up to the cervix, a string or thread being tied around it to facilitate removal. It should be left twelve or twenty-four hours. In the case of erosion or endometritis an astringent may be dissolved in the glycerin, but the pure glycerin produces the most copious flow. It is often used with advantage after puncturing or leeching.

PASSIVE HYPERÆMIA OF THE UTERUS.

Passive hyperæmia may be by itself a cause of subinvolution and hyperplasia, but is more frequently associated with active hyperæmia or inflammation, and tends to ag-

gravate their effects.   All displacements of the uterus tend more or less to interfere with the return of the venous blood from that organ.   Those which have the most powerful influence are prolapse of the second or third degree (see p. 110) with strangulation, and acquired retroflexion, which causes the veins to be compressed against the utero-sacral ligaments, as well as from the effect of the curvature of the uterus itself.   Passive hyperæmia is also produced by general causes of venous obstruction in the heart, lungs, or liver, and by any local pressure on the veins by ovarian or other tumors, ascites, or fecal accumulations, and is also promoted by want of exercise or constipation.   Any fixation of the uterus also tends to passive hyperæmia by interfering with the freedom of its motions, and, in most instances, leads to its enlargement.   Such cases are frequently complicated by the effects of inflammation, but hyperplasia is brought about through fixation of the uterus even by a peritonitis which did not originate in the pelvis.   Passive hyperæmia is apt to be promoted, in all classes of society, in the effect of posture : in the laboring classes by prolonged standing, with which is often associated a greater or less degree of prolapse of the pelvic viscera ; amongst the wealthy by the excessive use of the dorsal reclining position in cushioned chairs or sofas, as opposed to the recumbent posture, and by the use of feather beds instead of firm mattresses.   In the dorsal reclining position the pelvic brim is rendered nearly horizontal, instead of being inclined about 55° to the horizon, as it should be in the upright position.   The pelvis is thus exposed to the full weight of the abdominal viscera, and the return of venous blood from it is at the greatest disadvantage, while any tendency to retroversion or retroflexion is promoted by gravity.   At the same time, the use of soft cushions obviates the natural tendency which persons resting in a harder seat have to change

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their position frequently, and so assist in an important degree the venous circulation. In lying on a feather bed, also, the pelvis sinks in and becomes the lowest part of the body, whereas, upon a hard couch, in consequence of the greater width of the hips, the pelvis is somewhat higher than the shoulders.

The relation of passive hyperæmia to inflammation is that it does not, by itself, tend to produce inflammation, although it may lead to hypertrophy, and even to associated degeneration, but that it renders the tissue vulnerable to slight causes of inflammation, and makes the inflammation more obstinate when once excited, and repair more tardy. An example of this may be found in the case of ulceration of the legs, associated with varicose veins, and the same principle is largely exemplified in the case of the uterus.

Treatment.—The first indication is to remove, if possible, all direct causes of venous obstruction, general or local, and especially to cure displacements, more particularly retroflexion or prolapse. Regulation of the bowels is of the utmost importance, and the practice of at least a daily evacuation at a regular time must be enforced, much trouble often arising from mere carelessness in this respect. The greatest relief is afforded by saline aperients, such as sulphate of magnesia and sulphate of soda, and a convenient mode of giving these drugs is in the form of one of the mineral waters, as Hunyadi Janos, Friedrichshall, or Pullna, to be taken the first thing in the morning with an equal quantity of hot water. When hyperæmia of uterus or ovaries is associated with much pelvic pain or tenderness, it is often desirable to secure a somewhat liquid motion at least twice a day, evening as well as morning, so as to diminish as much as possible the venous pressure during the hours of sleep. For this purpose drachm doses of sulphate of magnesia may be given two or three times a day. In all cases of passive hyperæmia postural treatment should receive due attention,

since the blood pressure in the pelvis is necessarily increased in the upright position, and the ratio of increase, compared with the total pressure, is much greater in the veins than in the arteries. Long standing or sitting should be avoided, as well as the undue use of the dorsal reclining position on cushioned chairs, and the use of soft feather beds. Rest on a flat couch or bed in the lateral or semi-prone, rather than the dorsal, position should be frequently taken.

Passive hyperæmia receives benefit from all external agencies which act as stimulants to the general circulation, and especially to the heart. Of these some form of cold bath—the most generally useful being the hip-bath—taken on rising in the morning, is the most powerful; and in combination with this the cold vaginal douche, administered by Higginson's syringe, is a valuable adjuvant, provided that no active inflammatory state of pelvic organs be present. Failing the vaginal douche, the bath speculum, a small tube with perforations, may be used by the patient. In winter the water may be warmed to about 60°. If neither cold douche, hip, nor sponging bath can be borne, alternate sponging with hot and cold water is a milder stimulant. If there is any weakness of the heart's action, the administration of digitalis helps to diminish general venous pressure, and a suitably nourishing diet and general tonics tend to the same effect. The veins of the uterus are emptied by the influence of ergot and other drugs, causing contraction of the uterine walls, though these act more especially upon the arterial supply. The use of local depletion has been already mentioned (p. 154).

INFLAMMATION OF THE UTERUS.

Inflammation of the parenchyma of the uterus is termed metritis; catarrhal inflammation of its lining mucous membrane, endometritis. In the most acute forms of inflamma-

tion all the tissues of the organ take part, and body and
cervix are usually involved together, the affection of the
body being the most important. Acute endometritis and
acute metritis will therefore be considered together as a
whole. Chronic endometritis, or metritis, may affect either
the cervix alone, the cervix and body together—in which
case the disease of the body is the most important—or, in
rarer instances, the body alone. It has already been de-
scribed how, even in chronic affections, the inflammation is
never entirely confined to the mucous membrane, but ex-
tends, in greater or less degree, to the adjoining parenchyma
(see p. 157). Inflammation of the mucous membrane of
the cervix, or cervical endometritis, will therefore be de-
scribed in connection with inflammation of the substance of
the cervix; that of the mucous membrane of the body, or
corporeal endometritis, in connection with chronic metritis.

ACUTE METRITIS AND ENDOMETRITIS.

Causation.—Acute inflammation of the whole uterus, in
its most intense form, is very rare, except as the result of
septic absorption after parturition or abortion, or after
operations upon the uterus, the evacuation of retained men-
strual fluid, or the use of tents. Next in intensity is that
produced by a traumatic cause, such as intrauterine injec-
tions, intrauterine stem pessaries, cauterization of the cer-
vix or cavity of the uterus. In some of these cases absorp-
tion of septic material may also play some part. Acute
endometritis, in which the whole thickness of the uterine
walls also generally participates, but in a less extreme de-
gree, is not unfrequently produced by exposure to cold, es-
pecially at a menstrual period, extension of gonorrhœal or
other acute inflammation from the vagina, partial retention
of menstrual blood in consequence of flexion or stenosis, or
excessive coitus. It may also arise in the course of specific
fevers.

Pathological Anatomy.—Acute metritis is always complicated by endometritis, and in the more severe forms the inflammation extends to the peritoneal surface of the uterus, which becomes covered with lymph, and sometimes also, especially in the septic variety, to the neighboring cellular tissue. The uterus becomes hyperæmic and enlarged by infiltration of serum, while, in the most acute form of inflammation, ecchymoses are scattered through its substance. In the septic variety, small collections of pus may be found between the muscular fibres, in the veins of the uterus, or still more frequently in the veins of the broad ligament adjoining. Purulent peritonitis may also be set up, and in cases dependent upon lymphatic absorption the affection of the peritoneum often preponderates over that of the uterus itself. Acute abscesses of notable size in the uterine wall have occasionally been recorded, but are very rare. Much more frequent are abscesses in the ovaries, or cellular tissue of the broad ligament. The disease may also end in acute or chronic pyæmia. In acute endometritis the mucous membrane is swollen, softened, and injected; that of the body of the uterus secretes at first thin serum, and afterwards muco-purulent fluid, often tinged with blood. The secretion of the cervix, normally clear and tenacious, becomes more copious, thin, and turbid. The inflammation is liable to extend along the Fallopian tubes and attack the peritoneum, even when the substance of the uterus is not involved in any great degree.

Results and Symptoms.—In most cases of severe septic or traumatic metritis, while the uterus itself is found to be swollen and excessively tender, the symptoms of periuterine inflammation, especially of that of the peritoneum, preponderate over those of the metritis proper. Both septic and traumatic forms are marked by rigors and considerable elevation of temperature. In the septic variety the increase in pulse-rate is often more marked than that of temperature,

and as the disease advances the pulse, while becoming small, becomes at the same time compressible. In bad cases in which the peritoneum is extensively affected, the abdomen quickly becomes tympanitic, and the breath acquires the peculiar sweetish odor of septicæmia.

In acute endometritis, with more or less participation of the uterine walls in the inflammation, but without any periuterine complication, the symptoms are pain, with a sense of weight and heat or throbbing in the pelvis, and pain also in the back, groins, and thighs. Considerable febrile action is present in the more severe cases. The pain is much aggravated by movement, or by any bearing-down effort ; there is often much vesical tenesmus, and the urine is generally high-colored. There may be paroxysmal aggravations of pain due to uterine contractions, and lasting for an hour or two together. Occasionally there is an active diarrhœa for a time, set up by reflex irritation, though, with the exception of these attacks, the bowels are generally constipated. When endometritis or metritis arises during menstruation, its immediate effect is usually the arrest of the flow. Septic metritis has a similar effect upon the lochial discharge, or that which follows abortion. In traumatic endometritis, however, especially when induced by caustic applications, such as the insertion of the solid nitrate of silver into the uterine cavity, there may be profuse sanguineous discharge in the early stage. Ordinarily, at the outset of acute endometritis the discharge is scanty and serous ; after a few days it becomes profuse and muco-purulent, often offensive to the smell, and sometimes tinged with blood. Usually it has an irritating effect upon the vagina and vulva, and may cause excoriation of the thighs.

In septic metritis the prognosis is always grave, and bad cases pass rapidly into purulent peritonitis, and end fatally in spite of all treatment. Simple acute endometritis and metritis are apt to merge into the chronic form of the dis-

ease, and relapses are specially likely to occur at ensuing menstrual periods.

Diagnosis.—Endometritis and metritis uncomplicated by periuterine inflammation are distinguished by the mobility of the uterus, and the absence of any thickening round it. Constitutional disturbance is less than in pelvic peritonitis or cellulitis, but greater than in simple vaginal inflammation. On vaginal examination, the cervix is found swollen and sensitive, its arteries often pulsating strongly and the os patulous. On bimanual examination, the body of the uterus is found to be very tender on pressure, and still more so if movement be imparted to it. It is often distinctly enlarged, and, if its previous size be known, the degree of swelling indicates the extent to which the uterine parenchyma has taken part in the inflammation. If the speculum be used, the cervix is seen to look red and œdematous, and to contain shreds of mucus, scanty serous fluid, or muco-pus. As a rule, the sound should not be used. If employed, it causes great pain, and generally some bleeding.

Treatment.—In *septic metritis* the first indication for treatment is to get rid of the exciting cause. Any retained placenta, or clot, or decomposed polypus or other tumor, should be, if possible, evacuated at the very commencement of symptoms. When the inflammation is fully established, and the os does not admit the finger, it may be a difficult question whether artificial dilatation of the cervix is desirable. When, however, the discharge has any considerable fetor, and it is suspected that there is something in the uterus, it is better to run the risk of interfering. It is preferable, if possible, to introduce the finger with the aid of an anæsthetic, and avoid the use of tents. If tents are used, care should be taken to dilate the cervix by a single application, and not to leave them longer in place than necessary. The uterus being sufficiently evacuated, it should be washed out at intervals with antiseptic fluid. A solution

of carbolic acid (1 in 40), or a weak solution of iodine (Tr. Iodi. ʒij ad Aq. Oj) is preferable to one of permanganate of potash, since the latter rapidly loses its efficacy in contact with organic matter. The best apparatus to use is a funnel or other irrigator acting by hydrostatic pressure attached by a flexible portion to a long silver tube with a rounded extremity, having openings on all sides. In the absence of a metal tube, a large gum-elastic catheter may be used. To avoid the introduction of air, care should be taken first to fill the tube completely, and then a clip should be placed upon the elastic portion, until the terminal part is introduced up to the fundus.

Quinine in full doses is generally useful, and, if temperature is very high, it is well to begin with from 30 to 60 grains, given in two or three doses at short intervals, until the temperature is markedly influenced, or cinchonism produced. If vomiting interferes with the retention of the quinine, a smaller dose may be given subcutaneously, the kinate of quinine* being the best form for this purpose. Opium, or morphia, must be given in sufficient quantity to allay the pain. Locally, the fomentations or turpentine stupes assist towards this object. Other internal antiseptics, such as sulphite or sulpho-carbolate of soda, or salicylic acid, have scarcely shown themselves to be equal in value to quinine. In highly adynamic states, however, Warburg's tincture, containing quinine, with a great variety of other substances, among which are aromatic stimulants, has sometimes been found more serviceable than quinine alone. Two successive doses of half an ounce, undiluted, may be given at two or three hours' interval, brandy or beef tea only being taken meanwhile. In a similar adynamic state, with much tympanites, turpentine, in doses of 15 or 20

* One part of the salt is readily soluble in four parts of water. See a paper by Mr. Collier in the Pharm. Journal, Aug. 10th, 1878.

minims, may be useful as a stimulant. If high temperature persist, it should be reduced by direct application of cold. For this purpose the most convenient means is Thornton's ice-water cap, whereby a continuous stream of ice-cold water is made to circulate round the head. Another method is to place the patient upon a water-bed, from which water is from time to time drawn off, and cold water added. It is of the highest importance to support the strength by administering such nourishment as milk, beef tea, and eggs, at short intervals, as well as stimulants in ample quantities. If food is rejected by vomiting, recourse should be had at once to nutrient enemata. For this purpose the "fluid meat" prepared by Derby & Gosden, 140 Leadenhall Street, is of great value.

In simple *acute endometritis* (with more or less implication of the parenchyma, but without periuterine inflammation), absolute rest in bed should be enjoined. If much fever and pain are present, from four to six leeches may be applied near the anus. This is better than applying them to the cervix, since too much disturbance of the patient is thereby involved, and increase of pain is sometimes produced. At the outset, minim doses of aconite every hour may be given to diminish the fever. Sedatives, with salines, especially the nitrate of potash, or acetate of ammonia, should afterwards be administered; or, when pain is acute, full doses of opium or morphia, either by rectum, subcutaneously, or by the mouth. Fomentations or linseed poultices, covered with oil-silk, should be kept applied to the hypogastrium. At a somewhat later stage, hot hip-baths, or copious warm vaginal injections of decoction of poppies, or of linseed or starch, with the addition of a drachm of laudanum to the pint, have a valuable sedative effect. Purgatives must be avoided in the acute stage, but the rectum should be unloaded, if necessary, by an enema. Later saline laxatives are useful.

CHRONIC INFLAMMATION OF THE CERVIX, CHRONIC CERVICAL ENDOMETRITIS, ECTROPION, EROSION, AND FOLLICULAR DEGENERATION OF THE CERVIX.

Causation.—The majority of cases of inflammation of the cervix may be divided into two great classes,—first, those in which the primary affection is catarrhal inflammation of the lining mucous membrane, and in which the parenchyma of the cervix becomes only moderately swollen, and eventually indurated; secondly, those in which the whole thickness of the cervix becomes inflamed from the injuries received in parturition, and eventually undergoes a process of extensive hyperplasia and induration, while cervical endometritis at the same time persists. The first class comprises by far the greater part of the cases which occur in virgins or nulliparous women, since in them it is rare for the cervix to undergo any great degree of hyperplasia, unless, either from congenital elongation or prolapse, it becomes subject to mechanical irritation.

Of the first variety of endometritis, the predisposing causes are similar to those of catarrhal inflammations of other mucous membranes, such as general debility, and the strumous, rheumatic, or gouty diathesis. Of exciting causes, the most frequent are the effect of cold, extension of inflammation, gonorrhœal or simple, from the vagina or from the body of the uterus, displacements of the uterus, excessive coitus, and direct traumatic causes, such as the use of an intrauterine stem.

The second variety of inflammation arises from the bruised condition in which the cervix is left after labor, with numerous ecchymoses in its substance, damage to its epithelium, which is soon afterwards shed, and frequently more or less deep lacerations along its edge. The failure in the healing of these lesions, and their passing into a state of chronic inflammation, may be due to the lacera-

tions having been too deep to heal spontaneously, or may be brought about by a too early getting up, by displacement of the uterus, or by any of the causes already enumerated which tend to produce subinvolution (p. 135), or hyperæmia (pp. 150, 156) of the whole organ.

Among the injuries produced by labor, the most important are lacerations of the edge of the cervix. If these are superficial, they may heal more or less completely; and this also happens more readily when the laceration is anterior or posterior. If, however, there is a deep laceration at each side, the anterior and posterior lips of the cervix roll outward, so as to evert the lining mucous membrane, and the condition termed *ectropion of the cervix* is thus produced. The delicate mucous membrane, turned outwards towards the vagina, is exposed to friction, and becomes inflamed. It then becomes swollen and deeply injected, and its surface granular from irregular proliferation, so that it closely resembles the surface of an erosion or granular inflammation at a spot originally covered by squamous epithelium. At the same time hyperplasia results in the portions of the cervix intervening between the clefts, and leads to distortion and induration. Similar results to those produced by labor may follow if the cervix is bilaterally incised to too great a depth.

Erosion, or Granular Inflammation of the Cervix, may originate simply from catarrhal endometritis. The inflammation of the cervical canal extends to the mucous membrane around the os. From the effect of irritation, the squamous epithelium proliferates and becomes softened, while it is, at the same time, macerated in the morbid cervical discharge. It is then shed, in the greater part of its thickness, either gradually or in bulk, and leaves behind a congested and slightly granular surface. Erosion, however, is found far more frequently in parous than in nulliparous women, and the more severe forms of the affection are very

rarely seen in the latter. In the majority of cases it takes its origin from labor, commencing either with the shedding in bulk of the bruised and damaged epithelium, after parturition, or by its more gradual disintegration, in consequence of the inflammation which is a sequel of that event.

Pathological Anatomy.—In chronic cervical endometritis, the mucous membrane is swollen and hyperæmic, the glands more especially being enlarged. The secretion is increased in quantity, and becomes more opaque and stringy, often filling the cervix with a tenacious plug. In a later stage the mucous membrane becomes hypertrophied, filling the cervical canal, and protruding somewhat at the os. The whole cervix is swollen and soft in the earlier period, but becomes indurated by areolar hyperplasia in the later stage. This change is much greater in those cases in which the disease commences with inflammation of the whole thickness of the cervix after labor, especially when its edge has been cleft by lacerations, in which case the diagnosis from carcinoma may become difficult.

When *simple erosion* arises by detachment of the squamous epithelium *en masse*, the slender papillæ, which, in the normal state, reach nearly to the surface, are carried away at the same time. The surface left is only slightly granular. In more severe forms of the affection, to which the name of *villous or papillary erosion* has been applied, the inflammation proceeds further, and the mucous membrane becomes elevated into soft, deep-red papillæ, which readily bleed. It has generally been considered that the surface becomes entirely denuded of epithelium, more or less of the papillæ being left, and that the villous prominences are due to the overgrowth of these papillæ. According to the recent researches of Ruge and Veit,* however, the surface always re-

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* "Zeitschrift für Geburtshülfe and Gynäkologie," Bd. ii, Hft. 2.

mains covered with a single layer of cylinder-like epithelium, which is really derived from the deepest row of the original squamous epithelium. The normal papillæ are always thrown off: the cylinder-like epithelium grows inward, so as to form glandular crypts, and the villous prominences arise by growths of vascular connective tissue between these crypts. In the more severe forms the glandular crypts increase and proliferate. The very commencing stage of cancer, according to the same authors, differs from this condition only in the fact that the epithelium of the adventitious gland cavities proliferates, so as partially, or entirely, to fill up the acini. Opinions have differed as to whether the so-called erosion deserves the name of "ulceration." It is clear that, although in the initial stage there is a loss of substance of vascular papillæ as well as of epithelium, there is no progressive ulceration, and the term "ulceration" is not a suitable one, the condition being rather that of inflammation with glandular degeneration.

In another and less important form of erosion, which has been called *aphthous, or herpetic erosion*, inflammation of the mucous membrane leads to the formation of small vesicles, which burst, and leave an eroded spot. These generally heal readily without treatment.

Cystic degeneration may arise from closure of the mucous glands by swelling of the mucous membrane, and adhesion of the edges of the orifice. The glands then become distended into small cysts, known as *ovula Nabothi*. Within the cervical canal, the swelling cysts force up the mucous membrane into an elevation, and take the form of minute polypi. Similar small cysts are often found on the vaginal surface of the cervix, but these do not so easily elevate the denser mucous membrane. They may be seen, and more readily felt, as minute protuberances beneath it. According to Ruge and Veit these are not pre-existing glands, but are formed under the influence of irritation from the *rete*

malpighii of the squamous epithelium. The distended follicles may burst if the inflammation in them is more severe, and give rise to *follicular erosion.*

Results and Symptoms.—The cervix is, in general, but slightly sensitive, and hence its inflammation may cause little or no pain. On account of its rich supply of sympathetic nerves such a condition is apt to manifest itself rather by distant and reflex symptoms, the connection of which with any uterine malady may be easily overlooked. A constant symptom, however, is leucorrhœa, and, in doubtful cases, this may be an indication for investigating the condition of the uterus. The patient may nevertheless fail to notice it, though its existence is revealed on the use of the speculum. In simple catarrhal inflammation of the cervix, the discharge is clear, glairy, and more tenacious than normal, often forming a plug in the cervical canal. When inflammation is more severe, and especially when it is combined with villous erosion, the discharge may be mucopurulent or purulent, and is occasionally tinged with blood. By its irritating effect it may set up vaginal inflammation. If inflammation attacks the whole tissue of the cervix, there is usually pain in the back and loins, especially over the sacrum, some pain on walking, and pain on sexual intercourse. In the case of villous erosion, coitus often gives rise to hæmorrhage. Hyperplasia of the cervix often gives rise to irritation of the bladder or rectum, as the result of pressure, especially if any anteversion or retroversion is present. Reflex symptoms are not so marked in inflammation of the cervix as in that of the body of the uterus, but are often produced in predisposed subjects. Among the most frequent are nausea, vomiting, dyspepsia, vertical headache, intercostal neuralgia, and hysterical manifestations.

An erosion, while generally in the first instance the result of some other condition, as endometritis or inflamma-

tion of the whole substance of the cervix, itself often becomes a source of reflex irritation, and maintains a hyperæmia not only of the cervix but of the body of the uterus, and the ovaries, all of which are frequently found to be enlarged and tender, in conjunction with cervical inflammation. When this is the case all the distant nervous symptoms generally associated with irritation of the body of the uterus or ovaries, may be produced. Under these circumstances menorrhagia is often a prominent symptom, and the first thing necessary in its treatment is the cure of the disease of the cervix. In cervical inflammation sterility is often produced by the obstruction to the spermatozoa formed by the plug of mucus in the os, or by the deleterious influence upon them of the cervical secretion. These obstacles do not, however, always form a bar to conception ; and if pregnancy occurs the resulting hyperæmia tends to render worse any inflammation, and especially any erosion which exists. From this cause may arise hæmorrhage during pregnancy, severe vomiting, or other reflex symptoms, and abortion or miscarriage.

The natural course, both of chronic cervical endometritis and of erosion is a very tedious one, with but little tendency to recovery, although a cure may result by improvement of general health. They are fairly amenable to treatment, although improvement is often slow, and persistence in treatment for four or six months is not unfrequently requisite. If there is extensive hyperplasia of glands cure can only be effected by vigorous measures. Long-standing hyperplasia of cervix, with induration, is little amenable to remedies. Since cancer of the cervix is excessively rare in virgins, it appears certain that erosion or other form of inflammation may be the starting-point of cancer in persons predisposed to that disease ; and this view is confirmed by the close approximation found by Ruge and Veit in the histological characters of villous erosion toward those of com-

mencing cancer. Hence it is of great importance not to omit the due treatment of erosion when the age has been reached at which cancer becomes probable; an age which, in the case of the cervix uteri, must not be reckoned as much beyond thirty years.

Diagnosis.—In simple cervical endometritis vaginal touch may reveal only slight enlargement, or may fail to detect anything. The speculum will show the os to be congested, and generally either pouring forth copious, clear, viscid mucus, like white of egg, or filled with a more tenacious and opaque plug of similar mucus. The characteristic glairy mucus may sometimes be observed in the vagina when the os does not happen to contain any. If the plug be removed by twisting it round a Playfair's plug wrapped in cotton-wool, the interior of the cervix is seen to be red, swollen, and granular, a condition which is more manifest if the bivalve speculum (Fig. 5) is used, and expanded rather widely so as to stretch open the os. The mucus is clear and alkaline as secreted by the cervix, but is rendered more opaque by contact with the acid vaginal secretion. In the mixed discharge the acid usually preponderates. In most of the cases occurring after delivery, broadening of the cervix from hyperplasia will be detected by the finger, and frequently the clefts resulting from laceration will be felt. In ectropion arising from bilateral laceration of the cervix the condition existing is often more manifest to the finger than to the speculum. If, however, a Sims's speculum be used, and the lips of the os are drawn together into their original position by two tenaculum hooks, the exact relation of parts will readily be seen.

The more severe kind of erosion is easily recognized by the touch as a soft, villous, velvety surface. A simple erosion feels softer and more granular than the normal mucous membrane, and is almost always associated with some broadening of the cervix. In the healthy cervix a *tactus eruditus*

may always determine the negative as to erosion, but there may sometimes be an uncertainty in distinguishing by touch between a slight existing erosion and one that is healed, or an irregularity due to hyperplasia or degeneration of glands. The speculum will always resolve the doubt and show the erosion as a circumscribed, deeply red, granular, or villous surface, rather elevated above than depressed below the surrounding mucous membrane (Fig. 50). In the

FIG. 50.
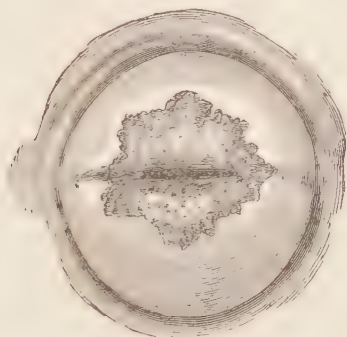
Erosion of the Cervix.—(After Barnes.)

more severe form of erosion bleeding is readily produced by contact with the speculum, but a great proneness to bleed on a gentle touch with the finger should always raise the suspicion of the presence of commencing cancer. Difficulty is often found in introducing the sound in a case of cervical endometritis from its point catching in the folds of the swollen or hypertrophied mucous membrane, and when this is the case slight bleeding may be produced. Otherwise, if there is no complication with corporeal endometritis, the sound may be passed to the fundus without causing bleeding or the pain which usually follows its introduction in that disease.

Treatment.—Constitutional remedies are of great import-
ance, though local treatment is usually required in addi-
tion. Nourishing, but not too stimulating diet, with abun-
dance of fresh air, and gentle exercise without fatigue, are
to be enjoined. Causes of mental depression should be
avoided as much as possible, and change of scene is often
of great value. Any depressing influence, such as prolonged
lactation, should be removed. The medicinal treatment
should be of a tonic kind, with special reference to the im-
paired digestion, which is a usual concomitant. Nitro-hy-
drochloric acid, with nux vomica, or strychnia, and a veg-
etable bitter, to be taken directly after meals, is a useful
prescription.* If there is much stomach irritability, bis-
muth, with or without small doses of morphia, may be sub-
stituted for the bitter. When the digestive function is re-
established, the liquor cinchonæ, tinctura cinchonæ flavæ,
or quinine, may be given in place of a simple bitter.
Iron is apt to disagree when there is any sign of liver inac-
tion or portal congestion, or when the case is complicated by
metritis or hyperæmia with considerable tenderness of the
uterus. But in the absence of these, especially in the later
stages, it may be usefully given in combination with a laxa-
tive.† Passive hyperæmia should be treated by the means
enumerated under that heading, and any displacement of
consequence rectified.

If acute pain or tenderness of the cervix is present, it is
well to commence with local depletion (see p. 154), and if
extensive degeneration of the cervical glands be detected,
the depletion may be effected by scarification of the lining
membrane of the cervical canal with a narrow-bladed knife.

* R. Acid. Nitro-hydrochlor. dil. ℞x ; Tinct. Nucis Vomicæ,
℞x ; Tinct. Gentian co., ʒj ; Aq. ad ʒj—ter die.

† R. Ferri et Ammon. Citrat., gr. v.; Magnes. Sulphat., gr. xxx ;
Sp. Chloroform, ℞xv ; Glycerin, ʒss ; Aq. ad ʒj—ter die.

Any prominent glands on the vaginal surface of the cervix should be punctured and touched with strong carbolic acid or solid nitrate of silver, since they keep up irritation by their presence. Coitus should be prohibited while any notable tenderness exists, and placed under strict limitation at all times.

Of local applications, the simplest are vaginal injections, which should always be used at least twice a day to wash away the secretion, if for no further object. When pain and tenderness are present they may be used moderately hot, and some glycerin and laudanum may be added. In the more chronic stage, they may be used at a temperature of about 60° F., or even colder, in conjunction with a bath at the same temperature. Syringes of pewter or glass are very ineffective, and the latter are dangerous from the risk of breakage. Higginson's syringe, provided with a vaginal tube about six inches long, and having a central ball, by compressing which a steady stream is produced, can be used by the patient herself more effectively. Still greater advantage, however, is attained if the patient be in the dorsal position during the irrigation. For this purpose either another person may work the syringe, a plan which allows two or three pints of fluid to be injected and reinjected for an indefinite time, or an irrigator may be used. This consists of a can or bucket, near the bottom of which is inserted a flexible tube provided with a stopcock, and connected with a vaginal delivery tube. By this apparatus the patient may manage the irrigation herself. It is most convenient for her to lie upon a bed-bath, or large bed-pan, having a flexible tube to carry the liquid away into a vessel. In the absence of this, she may lie with the buttocks projecting over the edge of a low bed or couch, the feet supported on two chairs, and a mackintosh arranged so as to conduct the liquid into a vessel. For an emollient effect an ounce of glycerin, or a drachm of borax or carbonate of

potash to the pint of water may be used; while the two latter salts tend also to diminish the cervical secretion. For a more astringent effect, alum, iron-alum, tannin, or sulphate of zinc may be used. The strength should be from twenty to sixty grains to the pint in the case of sulphate of zinc, and from one to two drachms or more to the pint for the rest. The liquor plumbi subacetatis dilutus is also a valuable remedy, and is less apt to irritate than most of the astringents, but it has the inconvenience of occasionally staining the linen brown, from formation of a sulphide. Before using these astringents a copious stream of simple water should be employed to wash away the secretions. In rare cases severe pain, uterine and peritoneal inflammation, and even death have arisen from the use of a vaginal injection. This has probably been due to the patient having inserted the tube into the patulous cervix of a retroverted uterus. Caution should therefore be used in recommending injections, while such a condition exists unremedied.

Astringent and alterative drugs may also be dissolved in glycerin, and used in the mode described at p. 156. The most useful are borax, tannin, or acetate of lead, in a strength of from thirty to sixty grains to the ounce. The last is especially serviceable in the case of erosion, the astringent contracting the vessels, while the glycerin depletes the congested surface. Astringents may also be used in the form of suppositories, of which the most useful are those containing five grains of tannic acid or acetate of lead. As a basis for suppositories, a combination of one part of powdered gelatin moistened and gently heated with three parts of glycerin, is much preferable to cocoa-butter. The formula recommended by Dr. Tilt of one part of pure paraffin to four of vaseline, may also be used.

Local Applications to the Cervix.—In the cervical leucorrhœa of virgins, a fair trial should be made of the means

FIG. 51.

already enumerated before resorting to the speculum, which, for obvious reasons, should not be used in their case, if it can be avoided. In married women, however, the speculum may be used at once for diagnosis, and if severe erosion or glandular degeneration be detected, the necessity for stronger direct applications may be immediately recognized. The object should be to effect a cure, if possible, without leaving any cicatricial tissue, and hence, the mildest remedy likely to prove effectual should be tried first. The solid nitrate of silver, which at one time was the favorite remedy in all cases, is now less generally preferred, since it may sometimes cause considerable irritation and hæmorrhage, if vigorously applied, and, in severe cases, is not so effective as other measures. It is most suitable for a case of simple erosion, the surface of which may be touched lightly over, so as rather to form a protecting film, than to have any deep caustic effect. This may be repeated two or three times at intervals of a week, but not too often. A tapering pointed stick of nitrate of silver may also be passed, on one or two occasions, into the cervical canal, when there is granular inflammation of the cervix.

Liquid applications may conveniently be made to the vaginal surface of the cervix with a brush, and to the cervical canal by means of Playfair's probe (Fig. 51), the terminal portion of which is roughened, and should be made of aluminium that it may resist acids. If a little absorbent cotton-wool is first spread out in a thin layer and then wrapped round it by rotating the probe, it becomes very firmly attached,

Playfair's
Probe.

and may then be dipped in the liquid to be used. For the application of nitric acid, in the absence of an aluminium probe, a vulcanite sound may be used. If the sound be first wetted, and a very thin layer of dry cotton-wool be wrapped closely round it with some dexterity, the bulbous extremity prevents any risk of the cotton being drawn off and left behind in the uterus. For making the application, Sims's speculum and the semiprone position are the best, but, in the absence of an assistant, the probe may be used with any other speculum, especially a short bivalve, or Neugebauer's speculum (Fig. 8), which may be so manipulated as to bring the uterus into a position of slight retroversion. Before any application is made, the tenacious mucus should be removed from the cervical canal by entangling it in a swab of cotton-wool, or, what is better, a small fragment of sponge, not to be used a second time. This is facilitated if a swab of glycerin, or white of egg, is first used.

Of the milder remedies, a solution of nitrate of silver, of thirty or sixty grains to the ounce, is by some preferred to all others, but it must be applied rather frequently, namely, at intervals of from five to seven days. A useful mild application to an erosion is Richardson's styptic colloid, consisting mainly of tannin dissolved in collodion. This forms a protecting film, as well as being astringent, and may be used at intervals after one or two applications of a stronger caustic. Dr. Atthill recommends the addition to it of fifty grains of carbolic acid to the ounce. The liquor or linimentum iodi may also be used, or a saturated tincture of iodine, which Dr. Churchill recommends to be applied once a week to the whole cervix as an absorbent in hyperplasia, after a single application of nitric acid. For an erosion which very readily bleeds, the liquor ferri perchloridi fortior may be used.

Perhaps the most widely useful of all applications, both for the cervical canal and for erosions, is strong carbolic acid,

a caustic of medium strength, which leaves little pain behind, since it has a somewhat anæsthetic effect upon the tissue, and is not likely to produce contraction or occlusion of the os. It may be used either simply liquefied by the addition of a sixteenth part of water, or an equal quantity of glycerin may be mixed with this. For erosions the stronger application is preferable. Care must be taken to protect the vagina and vulva, and a swab with water should be applied after the caustic has been in contact for a moderate time. Two or three applications may be made at about a week's interval, and then about three weeks should be allowed for healing. Another good application is Dr. Battey's "iodized phenol."* For severe forms of villous erosion, and for extensive cystic degeneration of the cervical canal, strong nitric acid is the best application. Recourse should also be had to the same caustic, if an erosion resists all milder remedies. While it produces a superficial eschar, its action is not deep, if it is not left very long in contact, and it does not usually produce much pain when applied to the cervix, though in some susceptible persons it evokes hyperæmia of the uterus, with reflex nervous symptoms, lasting for some days. The vagina should be protected, the swab of nitric acid should be kept in contact not more than about a minute, and a large swab, freely soaked in water, should be applied afterwards. One application of nitric acid is often sufficient, and it should not generally be used more than two or three times, at intervals of about four weeks. It may be followed by the milder astringents, as styptic colloid, or a solution of nitrate of silver. The acid nitrate of mercury is used by some in place of nitric acid, but it does not appear to have any advantage over it, and has occasionally produced salivation in susceptible sub-

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* Take of iodine, ℥ss; crystallized carbolic acid, ℥ij; water, ℨij. Mix and combine by gentle heat. Use either pure or diluted with glycerin.

jects.   Dr. Marion Sims's favorite caustic for villous erosion
is chromic acid, dissolved in an equal quantity of water.

FIG. 52.

He applies a drop or two on a pointed glass rod to
the granulations only.   Unless its action is very
carefully limited it is rather a painful caustic.   For
the treatment of the same affection Schrœder rec-
ommends the repeated application of acetic acid,
poured into a cylindrical speculum.

Some cases of glandular degeneration round the
edge of the os, and in the cervical canal, may resist
the action even of nitric acid.   The choice then lies
between the use of deeper caustics, as potassa cum
calce, potassa fusa, or the actual cautery, and the
scraping away the diseased glands with a sharp
steel curette (Fig. 52).   The latter appears prefer-
able, as less likely to cause contraction or occlusion
of the cervix.   After the use of any of the stronger
caustics it is a good plan to apply a tampon soaked
in glycerin.   Care should also be taken that con-
traction of the cervix does not arise ; and, if neces-
sary, a large metallic bougie should be occasionally
passed.   Occlusion has been produced by the re-
peated use even of the solid nitrate of silver.

In the more chronic stages of cervical endome-
tritis, the solid points of fused sulphate of zinc, in-
troduced by Dr. Braxton Hicks, are often useful,
but they are liable to cause a good deal of pain and
irritation when any active hyperæmia is present.

Sims's
Curette.

Milder applications may be made in the form of
crayons containing tannin or other astringents, but
these are usually less convenient than liquid applications.*

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* Tannin may be made into a crayon with glycerin alone. For other
drugs, one part of the drug may be used to one part of powdered gel-
atin and one part of glycerin. The gelatin is first moistened with water

In some cases of cervical endometritis, in nulliparous women, it is found that the os remains small, and the cervix has undergone little apparent change. Before local treatment can be satisfactorily used, the os must be dilated. This may be done by a sponge tent, or if the cervix is conical and the os congenitally small, by incision (see p. 57). The application of a sponge tent has a use apart from mere dilatation, if the disease is chiefly confined to the cervical canal, since by its pressure it modifies the mucous membrane, and removes granulations or projecting glands.

The inflammation of the whole thickness of the cervix, tending to hyperplasia, is little affected by internal remedies. At the stage when it is beginning to pass into induration, absorbents used locally may be of some service. A convenient application is Dr. Greenhalgh's iodized cotton, containing 20 per cent. of iodine. A pledget of this is placed in contact with the cervix, and kept in place by a tampon soaked in glycerin. Iodide of potassium and iodine may also be used dissolved in glycerin or in the form of suppositories. The treatment of the resulting cervical enlargement has been already considered (see p. 141).

Treatment of Ectropion of the Cervix.—After slight laceration of the cervix, any exposed cervical mucous membrane has its epithelium at length converted into the squamous variety, a process which may be accelerated by the use of astringents or caustics. If, however, there is deep bilateral laceration with eversion, this condition always remains a source of irritation and consequent hyperplasia, and the exposed mucous membrane is always liable to granular inflammation. For these cases Dr. Emmet has introduced the operation of paring the edges of the laceration with scissors,

and then mixed with the glycerin in a water bath, the drug being afterwards added. The mass is then rolled out into crayons like a pill-mass.

and uniting them by silver sutures. This operation has not hitherto been much performed in Britain, but deserves a more extensive use, though the proportion of cases requiring it would seem to have been much exaggerated by some. It is performed with Sims's speculum and the semiprone position, and is somewhat facilitated if silkworm gut is used for the sutures, and secured by Aveling's coil and shot. Care must be taken not to make the os too small, since it tends to contract afterwards by diminution of the hyperplasia. In a case of very old standing, when the lips of the os are too much deformed by hyperplasia to allow them to be brought together, both lips may be amputated by the galvanic cautery, or by the plastic method (see p. 146).

SYPHILITIC ULCERATION OF THE CERVIX.—Primary chancre may occur on the cervix, but is very rare in this situation. The ulcer is marked by sharply cut, indurated edges, depressed surface, and a tendency to become covered with false membrane. Mucous patches on the cervix are also rare, as also is tertiary syphilitic ulceration. The latter forms an excavated ulcer which readily bleeds, and is apt to be mistaken for an early stage of cancer. It is not generally accompanied by so much pain, or so great fetor in the discharge, but the history of constitutional syphilis will guide much in the diagnosis. Syphilitic ulceration has occasionally even laid open the rectum or bladder.

CHRONIC ENDOMETRITIS AND CHRONIC METRITIS.

Pathological Anatomy.—Chronic endometritis proper, or chronic corporeal endometritis, consists of inflammation of the mucous membrane of the body of the uterus. The inflammation is not absolutely limited to the mucous membrane, but extends to some extent, slight or considerable, into the substance of the organ (see p. 151), and is accompanied by more or less active hyperæmia of the whole uterus. En-

dometritis and metritis are therefore not separate affections, but the terms may be used respectively to indicate the preponderance of the disease of the mucous membrane or that of the parenchyma in different cases. Endometritis and metritis are frequently associated with subinvolution, of which they are often the cause, and with the effects of passive hyperæmia, which renders the tissue more vulnerable to irritating causes.

In milder and more recent cases of endometritis, the mucous membrane is swollen and hyperæmic. The superficial layers may eventually be thrown off, and by irregular proliferation villous or polypoid masses may sprout up. This constitutes the more severe disease of *fungoid or villous endometritis*, of which hæmorrhage is the prominent symptom. The secretion in milder forms of endometritis is an alkaline mucoid fluid, less tenacious than that of the cervix. When the inflammation is more severe it is mucopurulent, and may become rusty from slight admixture of blood, or more decidedly sanguineous. After long-continued endometritis, especially when the parenchyma is considerably affected, the mucous membrane becomes atrophied and thin, and its cells are infiltrated with an abnormal fibrillated tissue. The menstrual decidua is then imperfectly formed, and menstruation is generally scanty.

The parenchyma is most involved in those cases which originate in the more acute forms of inflammation, septic or otherwise, of the whole substance of the uterus, especially those which originate after labor or abortion. Even when the disease does not immediately follow upon parturition, but originates in catarrhal inflammation of the mucous membrane at a later period, after involution is complete, it tends to involve the parenchyma more in the parous than in the nulliparous uterus, on account of the looser texture of the uterine walls. In the early stage of chronic metritis the tissue is soft, red, swollen, and succulent, from infiltra-

tion of serum, and therefore prone to flexion. The uterus becomes enlarged, even when not already large from the effect of subinvolution, but the enlargement is more in the thickness of its walls than in its length, especially in the nulliparous uterus. At a later stage the tissue is indurated by growth of connective tissue and the state of hyperplasia, which has already been described (p. 135), is reached. Some degree of degeneration of tissue may arise from passive hyperæmia; but in the absence of any cause of venous obstruction, the degree of fibroid induration may be taken as a measure of the degree to which inflammation has extended through the parenchyma. In the majority of cases, especially in the parous uterus, the cervix as well as the body is involved in chronic metritis.

Causation.—Among predisposing causes of chronic corporeal, as well as of cervical, endometritis, or general debility, mental depression, chlorosis, and a strumous, rheumatic, or gouty diathesis. A part of some importance is also played by syphilis, which specially affects the developing uterine mucous membrane in pregnancy, and so leads to abortion. After abortion the lining membrane of the uterus is apt to be left diseased. Apart from abortion, endometritis is common in syphilitic subjects, though it presents no distinctive signs. When the constitutional taint is active the leucorrhœal discharge may convey the contagion. The chief exciting causes are the results of acute endometritis and metritis, the retention of portions of placenta, clots, or decidua, extension of inflammation from the vagina and cervix, cold, especially at menstrual periods, sexual excess, obstructions to the escape of secretions from flexion or stenosis of the cervical canal, and direct mechanical irritations, such as intrauterine pessaries, the use of the sound, or attempts to induce abortion.

Apart from the results of pregnancy, one of the most fertile causes of chronic endometritis is obstruction of the

cervix from flexion or stenosis; and, in this case, the mucous membrane of the body of the uterus may be inflamed, without that of the cervix participating. The menstrual blood is normally prevented from clotting by admixture with the acid vaginal mucus, but, if retained in any quantity, or for any long time, within the uterus, clots are formed, and these have an irritating effect. A similar influence is exercised by any shreds of mucous membrane which may be detached, if the menstrual decidua does not become completely disintegrated. The retained fluid, whether blood or mucus, also undergoes, if not any noticeable decomposition, yet sufficient change to give it an irritant effect. When the tissue near the internal os is compressed in consequence of flexion, the resulting passive hyperæmia also predisposes to inflammation.

Inflammation of the cervix, extending from the vagina, is more likely to affect also the body of the uterus, the more acute is its character. This is especially likely therefore to take place in the case of gonorrhœa, although a non-specific inflammation may occur, so acute as to be indistinguishable from it. The foundation of chronic endometritis and metritis is often laid at the commencement of married life, and though this may result simply from marital imprudence, yet gonorrhœal contagion is not an unfrequent cause. Dr. Noeggerath, of New York, has maintained that gonorrhœa, in both sexes, persists for life in certain sections of the organs of generation, notwithstanding its apparent cure, that this "latent gonorrhœa" may affect a healthy person either with an acute attack or with a similar chronic inflammation, which, in women, is apt to lead not only to chronic endometritis but to ovaritis, pelvic peritonitis, or even puerperal septicæmia. He also regards this infection from latent gonorrhœa as the commonest cause of sterility. It can scarcely be doubted that this view as to the incurability of gonorrhœa is greatly exaggerated. But

it appears to be the fact that a latent gonorrhœa or gleet in the husband very frequently infects the newly-married wife with an inflammation which is not acute enough for its nature to be obvious, but is yet the starting-point of chronic endometritis and consequent sterility.

Results and Symptoms.—The most constant symptom of corporeal endometritis is leucorrhœa. The discharge is of a less clear and tenacious character than that secreted by the cervix, and is more frequently muco-purulent. Very often it has an irritating effect upon the vagina and vulva. The discharge may collect for a time in the uterus, and be expelled occasionally, leading the patient to imagine that an internal abscess has burst. When endometritis is not limited to the cervix, but affects the body of the uterus, some menstrual disturbance is almost invariable. In the early stages the flow is usually profuse, painful, and often irregular, and is followed for some days by an excess of leucorrhœal discharge, which is often rusty from slight admixture of blood. Hæmorrhagic discharges in the intervals are not uncommon. Of fungoid endometritis the prominent symptom is profuse and intractable menorrhagia or metrorrhagia. In the later stages of endometritis, when, with general induration of the whole uterus, there is degeneration of the mucous membrane, menstruation becomes scanty, and generally painful. Sterility is a usual result at all stages, from the destructive effect of the altered secretion upon the spermatozoa, or from the mucous membrane having ceased to form a suitable nidus for the ovum.

The more prominent general symptoms of endometritis depend upon the whole parenchyma of the uterus being affected by reflex hyperæmia, or more or less involved by extension of inflammation to the deeper tissues. They vary greatly in intensity, according to the degree of such extension and the susceptibility of the patient to reflex nervous disturbance. Dragging pain is felt in the hypogastrium

and groins, often extending down the thighs, and also in the back, generally at a somewhat higher level than in affections of the cervix—that is to say, over the upper part of the sacrum or last lumbar vertebra. The pain is frequently most acute in one groin, generally the left, a circumstance sometimes, but by no means always, explained by the participation of the ovary on that side in hyperæmia or inflammation. There is usually tenderness on pressure over the situation of the uterus. Pain is greatly increased by locomotion or coitus, and the latter often leads to an aggravation of distress of considerable duration. More or less disturbance of the functions of the bladder and rectum is generally produced. There is pain in micturition and defecation from the pressure upon the tender uterus produced in any bearing-down effort, and frequently also irritability of bladder. Sometimes there is diarrhœa from a similarly irritable condition of rectum, but, more frequently, constipation, arising in great measure from the reluctance of the patient to make any effort.

Neuralgic pain is often felt in more distant localities, down the legs, along the edges of the false ribs, but more especially at the top of the head, or under the left breast, the last form of pain being often accompanied by palpitation. Flatulent distension of the abdomen, eructation, nausea, and vomiting are frequent results, and more or less dyspepsia is almost invariably produced. The effects of ovarian irritation are very similar, and both are explained, on anatomical grounds, by the connection of the sympathetic nerve supply of the upper part of the uterus with the ovarian plexus, and through this with the upper aortic and renal, and so with the solar plexus. In accordance with physiological doctrine, irritation of the sympathetic system inhibits the secretion of the gastric juice and other digestive fluids; and hence arises failure of digestion and fermentation of the food, by which catarrhal gastritis and enteritis may be subsequently

set up. The failure of nutrition thus brought about is a prominent symptom of uterine or ovarian disorder, which in this way may be, in predisposed subjects, the starting-point of phthisis.

By reflex hyperæsthesia may arise pruritus of vagina or vulva, vaginismus, or pain and tenderness in the coccyx, apart from any inflammatory lesion of that structure. All these pains are liable to exacerbations at menstrual periods, or from any exciting cause, as exertion, cold, or coitus. Other reflex neuroses are occasionally produced, such as asthma, or catarrh of the fauces, or air-passages. Pain in the nipples or breasts is common, especially at the onset of menstrual periods, and sometimes the glands become enlarged, containing a mucoid secretion, and their areolæ darkened, so that a patient may often imagine herself to be pregnant, especially when tympanitic distension of the abdomen is present. Such an abnormal stimulus to gland activity, protracted but of low intensity, is doubtless the usual cause of cancer of the breast, not having a traumatic origin. Other important changes of nutrition result from chronic uterine or ovarian disorder, such as dark rings under the eyes or general darkening of the skin by pigmentation. Eczema is not uncommon, and acne still more frequent; while the time of outbreak of these eruptions often has a relation to menstrual periods. With the general breakdown of health, to which uterine and ovarian disorder often leads, is frequently seen loss of hair and failure of sight, especially a form of amaurosis dependent upon chronic optic neuritis. In patients predisposed to hysteria the multiform manifestations of this disorder are an early result, and are generally aggravated at menstrual periods. In these cases, however, hyperæmia and tenderness, if not inflammation, of one or both ovaries are generally found to exist, in addition to the uterine affection. A vaginal examination, or pressure upon the uterus or ovary, will often

excite a nervous paroxysm, noisy eructations, or a feeling of nausea or faintness. In patients having a different predisposition, the nervous disturbance may take the form of epilepsy, hystero-epilepsy, or positive mental aberration, generally of the melancholic type. Sometimes a partial or complete paraplegia, generally gradual in its onset, is the result of uterine disorder, and is to be reckoned among the imperfectly understood class of cases included in the term of "reflex paralysis."

A recent endometritis, in which the parenchyma is not much involved, will generally yield to treatment; but chronic metritis, when it has reached the stage of induration, is one of the most obstinate of diseases. Untreated, it is commonly limited only by senile atrophy; and, even under the most judicious treatment, only a relative degree of cure is usually attained, and relapses frequently occur.

Diagnosis.—Corporeal is distinguished from cervical endometritis by the nature of the discharge, which has not the tenacious glairy quality distinctive of the cervical secretion, but is either thin and mucoid, muco-purulent, or, what is more characteristic, has a slight rusty tint. There is also greater tenderness and enlargement of the body of the uterus, as detected by bimanual examination, and disturbance of menstruation is a more constant symptom. The sound shows lengthening of the uterus, not accounted for by cervical hyperplasia. On reaching the fundus it usually causes considerable pain, and frequently nervous disturbance. Slight bleeding often follows upon its withdrawal. The cervical canal is generally more dilated than normal, but in cases of endometritis of the nulliparous uterus without affection of the cervix, it may be the opposite. The cervix may be normal in nulliparous women, but in other cases it is usually involved in the hyperplasia. In cases of doubt, whether inflammation affects the body of the uterus or the cervix only, the doubt may be resolved by the per-

sistence of the symptoms after treatment of the cervical disease. The diagnosis of *fungoid endometritis* may be established in two ways. (1.) The cervix may be dilated by a tent, and the finger passed up to the fundus in the manner described with reference to evacuation of the uterus after abortion (p. 141). The villous surface will then be felt. (2.) The blunt wire curette of Dr. Thomas, an instrument shaped like Sims's curette (Fig. 52), but having a loop a quarter of an inch in diameter, made simply of copper wire $\frac{1}{12}$ to $\frac{1}{16}$ inch thick, may be used as well for diagnosis as for treatment. This may be introduced without dilatation of the cervix if the canal be moderately patulous, and the cavity of the uterus gently scraped. The fungoid prominences will be brought away, and their character may be recognized by the microscope. If a sharp curette were used a fallacy might arise from the scraping away of the mucous membrane itself.

Treatment.—All exciting causes, such as inflammation of the cervix, or serious displacement of the uterus should be removed if possible. Thus when erosion or cervical endometritis is present, local treatment should be directed to the cervix first, since it is more readily accessible to such medication. When displacements are present the most important point to decide is whether to resort at once to a pessary, or first to treat directly the inflammation. As a general rule, in retroversion or retroflexion, as well as in prolapse, a vaginal pessary may be employed with advantage either immediately or after a short course of rest and local depletion, and the successful use of other means will then be facilitated. In anterior displacements, however, in which the deviation from the normal is not usually so extreme, while vaginal pessaries act at less advantage, it is usually preferable in the first place to try the effect of general means, with the addition of postural treatment and occasional replacement. Then, if this proves insufficient, careful trial

may be made of a vaginal, or in some cases, after removal of all active hyperæmia, of an intrauterine pessary. Even when no displacement can be detected, relief is sometimes afforded by the use of a small Hodge's or elastic ring pessary, which limits the mobility of the tender uterus, keeps it in a position of slight anteversion, and resists any tendency to partial prolapse. The hypogastric belt (see p. 126) may also give relief.

Active and passive hyperæmia are to be treated by the means enumerated under those headings (pp. 153, 158), especially frequent, but not too prolonged, rest in a completely horizontal position, the administration of saline laxatives, bromide and iodide of potassium, ergot, strychnia, or digitalis, and, when much tenderness is present, local depletion, either by bloodletting or the application of glycerin, though these are less effective than in inflammation of the cervix. Coitus must be strictly limited, though it is not always desirable to enforce an absolute prohibition, especially when ovarian hyperæmia exists. Internal remedies have little influence upon the inflammation of the parenchyma ; but when the enlargement is passing into the stage of induration, half-drachm doses of the liquor hydrargyri perchloridi, given three times a day in combination with a tonic, may be beneficial.

Every possible hygienic means should be taken to promote the general health, especially by fresh air, cold or sea bathing, sufficient mental occupation, and change of scene. A stay at a watering-place or hydropathic establishment, or a sea-voyage, is thus of great service. These advantages may be combined with the effects of bromine and iodine-in mineral waters, both in the form of baths and internally, at certain celebrated watering-places, especially Kreuznach, the virtue of whose water depends chiefly upon bromide of magnesium. The water of Woodhall Spa, in Lincolnshire, has a similar effect, but contains a greater proportion of

iodine. Diet should be nourishing but very simple, in view of the so constantly attending dyspepsia. Alcohol should be much restricted, since by relaxing the arteries it promotes active hyperæmia, and, moreover, chronic uterine disease is one of the commonest causes of intemperance in women, who are led to take spirits for the temporary relief of pain or of the feeling of sinking or depression from which they so often suffer. Taken with meals, however, a moderate allowance of alcohol may be useful as a stimulus to digestion, and a good claret or Burgundy is generally the best form to recommend. If any tendency to excess be suspected, it is better to enjoin total abstinence.

In so protracted a disorder as chronic metritis, it is desirable to avoid, as far as possible, the administration of opium or morphia, lest the patient become dependent upon the drug. If required during exacerbations or at menstrual periods, a morphia suppository may be given *per rectum*. For soothing pain, warm hip-baths, or, what are still more effective, whole baths, are a valuable resource. Vaginal douches at a temperature of not less than 110° F. have the further effect of stimulating absorption and diminishing the size of the uterus by the contraction of the uterine muscular fibres, and of the arterial walls which they produce. It is well, however, to commence the injections at a more moderate temperature, and gradually to increase the heat. When sedatives are required, others than opium may be tried in the first place. Besides bromide of potassium, belladonna, hyoscyamus, cannabis indica, or camphor may be given internally, and chloral if required to procure sleep. Of these belladonna acts most upon the sympathetic system and is specially valuable in vesical tenesmus, while it is often a useful addition to opium ; hyoscyamus has a greater soporific effect, and both of these are useful for their laxative tendency. Cannabis indica has a special influence in neuralgia and headache, besides being a general sedative.

Camphor is an anaphrodisiac as well as sedative if given in doses of as much as from five to ten grains. Bromide of camphor has been recently introduced, and may be given in Dr. Clin's capsules. Iodoform may be given with advantage in a suppository containing five grains, introduced *per rectum*. Belladonna suppositories are also more effectual *per rectum* than *per vaginam*.

Counter-irritants are not only valuable for relief of pain, but exercise an alterative effect upon chronic inflammation. They also appear to relieve reflex neuroses, such as vomiting, by a kind of inhibitory effect upon the nervous system. Flying blisters may be produced on the hypogastrium or groins by blistering fluid, and repeated at intervals. Reflex pains may be relieved by applications to the nerve-termination at the seat of pain, such as mustard poultices, turpentine fomentations, or a small quantity of the linimentum sinapis co. sprinkled on spongio-piline and kept applied six or eight hours. As a counter-irritant the linimentum crotonis may be applied with a sponge, or, as a sedative, equal parts of linimentum aconiti and linimentum belladonnæ may be used. In the same way comfort is afforded by plasters applied to the back, for which purpose emplastrum calefaciens, or emplastrum belladonnæ may be used. Strong caustic applications to the cervix, which have been considered under the head of Hyperplasia (p. 143), may prove more effectual counter-irritants than those applied externally.

Tonic treatment, such as that described under the head of Inflammation of the Cervix (p. 173), is generally useful in the course of chronic endometritis and metritis. Iron should not be given when there is a furred tongue, or any sign of portal congestion, till this condition has been relieved by occasional mercurial purgatives or other means. It is likely, also, to prove injurious while there is any marked hyperæmia, or tenderness of uterus. In the later stage, however, when there is much general debility, and a flabby

tongue impressed by the teeth, it is often of service, especially if combined with a laxative (see p. 174). In the stage of hyperplasia with induration, when menstruation is scanty, iron may be added to bromide of potassium, and if necessary, aloes also. Bromide of potassium alone in such cases is apt to diminish the menstrual flow and prolong the intervals.

Intrauterine Medication.—When endometritis, not complicated by any considerable degree of metritis, fails to yield to general remedies, and local treatment to the cervix, the most efficacious method is to apply remedies directly to the cavity of the uterus. If there is considerable inflammation of the parenchyma, but yet endometritis is the starting-point of, or forms a prominent feature in, the inflammation, it may similarly become desirable to treat the mucous membrane directly. In this case, however, more caution in the use of local remedies is necessary, and hyperæmia should in the first place be relieved as far as possible. The cases most urgently calling for intrauterine medication are those of villous endometritis with severe hæmorrhage.

Remedies are generally most conveniently applied in a liquid form by means of Playfair's probe (Fig. 51), or other similar instrument, wrapped very carefully and closely in a thin layer of cotton-wool, so that the cotton is not liable to slip off, or become wrinkled up. Unless it is desired to extend the application to the cervix also, the cervix should be protected by an intrauterine canula (Fig. 53), which also tends to prevent so much of the fluid being wiped off before it reaches the cavity of the uterus, while it renders the use of a tent unnecessary if the cervix is somewhat patulous. Dr. Atthill recommends a short platinum canula, which is introduced by a guide, and held in position by long forceps after withdrawal of the guide. It will be found more convenient, however, to have the canula fitted with a long handle as well as with a guide to facilitate its intro-

duction. If made of vulcanite, it answers every purpose, while it is much less costly than if platinum be used. Sims's speculum and the semiprone position should be used for the operation. The most generally useful fluids for the application are the liquor iodi or saturated tincture of iodine,

FIG. 53.

Canula for Intrauterine Medication.

a solution of nitrate of silver of from twenty to forty grains to the ounce, the liquor ferri subsulphatis, or liquor ferri perchloridi, strong carbolic acid, or carbolic acid with an equal quantity of glycerin, and strong nitric acid. Of these carbolic acid is the most generally useful in ordinary cases of endometritis, and the solution of iron may be used when hæmorrhage is a prominent symptom. Strong nitric acid is the most efficacious when a profound degeneration of the mucous membrane is indicated by profuse hæmorrhage, or by the failure of milder measures to cure. The very free application of this remedy has been especially lauded, but though ordinarily it is well tolerated, if used with care, it may sometimes in British patients, if not in Irish, excite considerable inflammation. A probe of aluminium, vulcanite, or platinum, wrapped in cotton-wool, as described already, and charged with the acid, is passed once up to the fundus uteri.

A convenient mode of making a mild application of the solid nitrate of silver to the interior of the uterus is to coat with it the point of a uterine probe. The bulbous end of the probe is slightly roughened, and then dipped repeatedly

in the nitrate of silver, fused in a platinum or porcelain capsule, until it is sufficiently coated. It is then passed up to the fundus. A small piece of the solid nitrate of silver, or one of the zinc points, is sometimes passed into the uterus by Simpson's portecaustique—a tube provided with a piston—and left there to dissolve. The medicated crayons described at page 180 may be used in the same way. The nitrate of silver thus used is apt to cause violent uterine tenesmus, and even inflammation ; and all solids excite irritation as foreign bodies, while from their becoming coated with mucus, their action is unequal. Drugs may also be inserted in the form of ointment, by a similar uterine applicator, provided with a piston. Dr. Barnes recommends such an applicator also for the introduction of strong nitric acid, a few drops of the acid being placed upon a sponge, and inserted in the tube of the instrument.

The last mode of intrauterine medication to be mentioned is that of the injection of fluids, and this is the most dangerous of all. The danger lies chiefly in the risk of the fluid making its way along the Fallopian tubes, either from the force of the injection, or what is more probable, from spasmodic contraction of the uterus. This has been demonstrated by autopsy, in cases where sudden death has followed the injection of perchloride of iron, even though the Fallopian tubes were not obviously more patent than normal. The risk is not entirely obviated by securing full dilatation of the cervix—a precaution which should always be taken—for the cervix generally contracts under the stimulus of the astringent; nor by the use of a double-action catheter, for the return canal may become blocked by a clot. Intrauterine injection cannot, however, be entirely dispensed with, and it is chiefly called for in cases of alarming metrorrhagia, when a sufficient bulk of fluid to arrest hæmorrhage cannot be applied by means of a swab, or when, from enlargement and irregularity of the uterine cavity, the

swab cannot come into contact with the whole of it. The safest plan is to use rather a small tube, not larger than No. 12 catheter, so that the cervix, after full dilatation, may not so readily grasp it, and to inject only by hydrostatic pressure, applied by means of an elastic tube and funnel, elevated only very slightly.

In fungoid endometritis the villous prominences may be destroyed either by the pressure of a sponge-tent introduced up to the fundus, by scraping the surface of the uterus by the blunt wire curette (see p. 190), or by the application of a strong caustic, such as nitric acid. Of these nitric acid has the greatest efficacy in modifying the nutrition of the mucous membrane. If the os is not fully patulous, the use of a tent may be chosen as the first measure, and it also forms a temporary plug. To obtain its influence upon the mucous membrane it should be long enough to reach the fundus, and should be rubbed down with sandpaper till it has a uniform, slightly conical shape (see Fig. 9), instead of bulging in the centre, like the tents commonly sold. The use of the blunt wire curette has the advantage of causing least disturbance, and may be tried first, if the cervix is open enough to admit it, and the symptoms not very urgent.

MEMBRANOUS DYSMENORRHŒA.

Causation and Pathological Anatomy.—In connection with endometritis may be considered the disorder called membranous dysmenorrhœa, which by some has been termed exfoliative endometritis, although it is still a matter of dispute whether its essential nature is inflammatory or not. It consists of the expulsion during the menstrual period, generally on the second or third day, of membrane either in shreds or forming a more or less complete cast of the uterus, which membrane, when examined microscopically, shows the structure of the uterine mucous membrane. Many other

apparent membranes may be passed at a menstrual period, such as fibrinous clots, exfoliations from the vagina or cervix, or mucus coagulated by astringents ; but such cases have no connection with the disease under consideration. It is also to be distinguished from cases in which repeated abortion occurs at intervals of little more than a month, a condition which may be due to an excess of menstrual nisus, or perhaps, in some cases, to an imperfect fertility on the part of the husband. Some have supposed that all cases of so-called membranous dysmenorrhœa are to be thus explained ; but it has been clearly shown that the complaint may occur in virgins.

Membranous dysmenorrhœa consists essentially in the menstrual decidua being thrown off in pieces of greater or less size, instead of being, as it should be, disintegrated and coming away in minute fragments. This result may depend upon excessive growth, too deep exfoliation, or an unduly fibrous character in the decidua, and the true explanation is not yet fully ascertained. The disorder may exist in any degree. If the fragments of supposed clot passed in cases of dysmenorrhœa are examined microscopically, it is not uncommon to find small shreds having the cellular structure of the uterine mucous membrane, and showing a few tubular channels, which are the gland apertures, divested of their epithelial lining. From this every grade may occur up to that in which a triangular cast of the whole uterus, showing orifices corresponding to the Fallopian tubes, is passed, although the slighter degrees generally escape the attention of the patient herself. In the complete cast the whole structure of the mucous membrane is to be seen, including enlarged orifices of glands, and an undue amount of fibrillar tissue is to be found among the cells. In some cases a cast is expelled every month, in others only occasionally, while smaller shreds of membrane come away at the intervening periods. Sometimes there is a history of similar shreds

having been passed since the first commencement of menstruation, which renders it probable that the affection may depend upon some peculiarity in the structure of the mucous membrane in certain individuals.

Membranous dysmenorrhœa is usually associated with active hyperæmia and other signs of chronic endometritis and metritis. There is often also true hypertrophy of the muscular walls owing to difficulty in the expulsion of the membranes. Dr. John Williams has maintained* that the pathology of the complaint is the presence of an undue amount of fibrous tissue in the uterine walls, and that the inflammation which usually accompanies it is secondary to the irritation produced by the shreds of membrane. Excess of fibroid tissue, however, is very common as a sequel of subinvolution with chronic metritis, without leading to any such result as membranous dysmenorrhœa. It seems more probable that in membranous dysmenorrhœa there is generally a congenital excess in the fibrillation of the uterine mucous membrane, and that this excess may be further increased from the effect of chronic endometritis.

Results and Symptoms.—The symptoms of membranous dysmenorrhœa, apart from those due to the hyperæmia or inflammation generally associated with it, consist simply of the pain and tenesmus evoked by the expulsion of the membrane. When the affection exists in any marked degree it generally gives rise to sterility. It is one of extreme obstinacy, and frequently persists for many years.

Diagnosis.—The more perfect casts are easily recognized by the naked eye, and the orifices of the uterine glands may be seen in them. Generally, however, the diagnosis must be confirmed by microscopic examination. If the cast has the structure of uterine mucous membrane, it only remains to distinguish the case from one of repeated abortion. The

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* Obst. Trans., vol. xix.

latter is generally characterized by irregularity in the intervals of apparent menstruation, but the most crucial test is to try the effect of temporary separation between husband and wife.

Treatment.—The first indication is to secure a freely open and straight cervical canal of much greater dimensions than are needful in the normal uterus. By this means distress is much alleviated, and the tendency of the membrane to keep up inflammation by mechanical irritation is diminished. At the same time the hyperæmia or metritis should be treated by bromide of potassium, ergot, purgatives, local depletion, or other suitable means. To arrest the tendency to formation of membranes only such measures as tend to effect a profound alteration in the nutrition of the uterine mucous membrane are at all hopeful. Applications of iodine, carbolic acid, nitrate of silver, or nitric acid, may be tried for this purpose, but even nitric acid has failed to cure. On the hypothesis that the disease is due to imperfect evolution of the uterus, the galvanic current applied by introducing the rheophore into the uterine cavity, and the galvanic stem pessary, have been tried, but without very encouraging results. The use of the galvanic stem, after all hyperæmia has been, as far as possible, subdued, deserves further trial. The administration of arsenic has done good in some cases, and this drug appears to have some selective and alterative action on the uterine mucous membrane. Pregnancy is likely to modify the mucous membrane more than any other influence. In some slight forms of the affection I have found it to be apparently cured after pregnancy and delivery, to reappear after an interval of several years.

CHAPTER VII.

NEW GROWTHS OF THE UTERUS.

MUCOUS AND GLANDULAR POLYPI OF THE UTERUS.

Causation.—Just as in cervical endometritis a single mucous gland, when its orifice has become closed, readily elevates the loose mucous membrane and becomes a minute polypoid growth, or Narbothian gland, so the same process may be exaggerated. A fold of mucous membrane containing numerous glands may take part in it, while hyperplasia of the stroma of the mucous membrane takes place, and in this way a *mucous polypus* is formed. The same process may also occur in the glands of the body of the uterus, or those near the edge of the os, or on the outside of the cervix.

Pathological Anatomy.—Mucous polypi generally vary from the size of a pin's head up to that of a hazelnut, rarely exceeding the latter dimension. They are made up of one or several mucous follicles, with a stroma of soft and delicate connecting tissue, containing many nuclei, the stroma predominating over the glandular portion. They generally grow from the cervical canal, and the pedicle then tends to become elongated until the polypus appears outside the cervix. Sometimes they grow within the cavity of the uterus, and then generally do not reach the cervix. Polypi of this variety are often found unexpectedly at autopsies. Mucous polypi are covered by a thin and very vascular mucous membrane, and are generally bright or deep red in color. Whether they grow from the cervix or body of the uterus they are often multiple, and, after the removal of one, others

are apt to grow in the same individual. When the proliferation of the gland follicles predominates over that of the cellular tissue, "*glandular polypi*" are formed. These are of two kinds: (1.) The "*cystic polypus*," formed by dilatation of a single follicle. These generally grow from the cervical canal, and are sessile, or nearly so, not larger than a cherry, and very fragile, being filled with mucoid fluid. (2.) The "*channelled polypus*." These are generally attached at the lower part of the cervical canal, or outer part of the cervix. They contain large irregular cavities, communicating with each other, and opening on the surface, often by rather large mouths. These are lined by cylindrical epithelium, and contain mucoid fluid. The surface may be covered by cylindrical epithelium, or by squamous epithelium, if the growth has sprung from the outer part of the cervix, or again partly by squamous and partly by cylindrical epithelium. These polypi grow to a larger size than mucous polypi, and may attain a diameter of two inches or more. They correspond to the "follicular hypertrophy of the cervix" of Schrœder. If they reach or pass through the vulva they are apt to become ulcerated on the surface. In some cases a proliferating papillomatous growth springs up in the cavities, the tumor thus showing an approximation toward the malignant type.

Results and Symptoms.—Small mucous polypi may exist without any obvious symptoms, but more generally they produce leucorrhœa and menorrhagia or metrorrhagia, with occasionally dysmenorrhœa and other symptoms dependent upon hyperæmia. The hæmorrhage is sometimes altogether out of proportion to the size of the polypus. It is due not so much to bleeding from the surface of the polypus as to hyperæmia set up by the irritation of its presence. In the same way the polypus tends to keep up and increase that hyperplasia of the cervix with which it is often associated at its commencement. The symptoms are generally greater while the polypus is within the cervix than after it is ex-

truded outside the os. Comparing ordinary mucous with glandular polypi, hæmorrhage is the more prominent symptom of the former, leucorrhœa of the latter.

Diagnosis.—The smaller mucous polypi, after they have passed outside the os, may sometimes escape detection by the finger from their extreme softness, but are easily recognized by the speculum. Polypi high up in the cervix, or in the cavity of the uterus, are generally only discovered when the cervical canal has been dilated for exploration as to the cause of hæmorrhage.

Treatment.—Very small and soft mucous polypi may be twisted off with forceps, and the base touched with liquor ferri perchloridi fortior, solid nitrate of silver, or nitric acid. Those of larger size are best removed by the écraseur (Fig. 54)—écraseur and wire both being of dimensions suitable to those of the polypus. This is preferable to cutting them off with scissors, since the hæmorrhage on cutting a mucous or glandular polypus is greater in proportion than that from a fibroid polypus. If the polypus be small the loop is most easily adjusted by the aid of a speculum. After the removal the patient should be kept in bed for a day or two. If intrauterine mucous polypi are detected as the cause of hæmorrhage, and are too small to be ensnared by a small écraseur, they may be destroyed by the pressure of a sponge tent, by the blunt wire or steel curette (Fig. 52), or, if necessary, by the application of nitric acid, as in the case of the villous prominences of fungoid endometritis.

FIBROID TUMORS OF THE UTERUS, OR FIBRO-MYOMATA.

Causation.—Fibroid tumors are among the commonest of uterine diseases. In most cases they date their origin to the period of active sexual life. Nothing certain is known as to their causation, but it depends in a measure upon hereditary predisposition, and they are specially frequent in the

negro race. It may be presumed that all causes of hyperæmia of the uterus favor their growth, and that they may take their starting-point from any localized inflammation, the result of parturition, abortion, or any other cause. They are by no means uncommon, however, in virgins.

Pathological Anatomy.—A fibroid tumor, more accurately called a myoma or fibro-myoma, is composed of the constituents of the normal uterine tissue, involuntary muscular fibres and connective tissue, in varying proportions, but, for the most part, in the main of muscular fibres. It is analogous to the tumors which frequently enlarge the prostate in the male sex. In most cases the tumor consists of one or more rounded masses, separated from the uterine walls around it by a capsule of connective tissue; but occasionally the tissue of the tumor is completely continuous with that of the uterus, and this is especially the case with the softer and more rapidly growing varieties. The encapsuled tumors are tough on section, their substance but slightly vascular, the cut surface white and glistening. In other cases, but much less commonly, the tissue is loose, and becomes œdematous by infiltration with serum, so that the whole is fluctuating and semifluid to the touch. Large collections of fluid may be formed by separation of the fibres, and in this way is constituted the *fibro-cystic* tumor. There is no cyst-wall, and the spaces are generally traversed by trabeculæ of cellular tissue.

Varieties.—The growth of a fibroid tumor commences in the substance of the uterine wall, but, by the effect of muscular contraction, it generally tends to be squeezed out, either towards the outside or the inside, according to the position of its starting-point. Hence there are four varieties of fibroids, which are called *subperitoneal* or *subserous* when projecting from the exterior of the uterus, whether pedunculated or not; *interstitial, intramural,* or *intraparietal,* when in the substance of the uterine wall; *submucous,* when

they project internally : *fibroid polypi*, when they have become completely extruded on the internal surface, so as to be attached only by a pedicle. As a rule, the whole uterus becomes hypertrophied, and its cavity enlarged, but in subperitoneal fibroids this is sometimes not the case, and it may even become atrophied. Fibroid tumors, especially those of the subperitoneal kind, are frequently multiple, and one or more varieties of them may coexist. By submucous or interstitial fibroids the uterine cavity is frequently much distorted. Fibroids occasionally grow in the cervix, but much less frequently than in the body of the uterus. Small fibroids growing in the anterior wall of the fundus tend to produce anteflexion, those in the posterior wall retroflexion of the organ.

Not unfrequently are found attached to the cervix small polypoid growths, whose tissue resembles that of the cervix itself, and is continuous with it, not inclosed in any capsule. Sometimes also the whole of one lip of the cervix becomes elongated in a polypoid manner. This condition usually results from the laceration of the cervix produced by parturition. Hyperplasia follows, and affects especially the portion of tissue intervening between two clefts, which afterwards may become constricted at its base, and so take a polypoid form. Polypi of this description, which are often associated with prolapse, are the "hypertrophic polypi" of Dr. Barnes.

Results and Symptoms.—The prominent symptom of those fibroids which enlarge the uterine cavity or project into it, that is to say, of the submucous and of many of the interstitial variety, is menorrhagia. This depends partly upon the increased surface, and partly upon the active hyperæmia of the mucous membrane due to the stimulus of the growth, and the passive hyperæmia which may result from pressure. In some cases the hæmorrhage takes the form of metrorrhagia. By the same hyperæmia is pro-

duced leucorrhœa, and often congestive dysmenorrhœa. If the exit from the uterine cavity is obstructed, as it often is by submucous fibroids or fibroid polypi, obstructive dysmenorrhœa is likely also to result, and frequently endometritis from the irritation produced by retained clots or secretions. Dragging pain is generally produced by the increased weight of the uterus, and the frequently associated hyperæmia or endometritis. Sometimes severe spasmodic pain arises from contractions of the uterus, excited by the presence of the tumor. Fibroid tumors which lead to flexion give rise to dysmenorrhœa, endometritis, hyperæmia, and the other results of that condition.

The remaining symptoms of fibroids are those due to mechanical pressure, and these are frequently the sole symptoms of subperitoneal growths. Vesical and rectal tenesmus are common, and sometimes retention of urine or extreme constipation is produced by direct pressure. In some cases this happens only when the tumor swells at menstrual periods. These symptoms are specially urgent when a fibroid growing from the posterior uterine wall is incarcerated in the pelvis. Sterility is a usual result, especially from submucous fibroids, and if pregnancy occur, there is great liability to miscarriage, and to hæmorrhage after delivery. A fibroid tumor in the pelvis may render delivery extremely difficult. Subperitoneal fibroids, however, of moderate size, if they do not obstruct the pelvis, are not inconsistent with natural pregnancy and delivery. When the tumor grows to enormous size, as is more likely to occur in the softer and fibro-cystic varieties, the circulation, respiration, and other vital functions may be interfered with, as in large ovarian tumors. Large fibroid tumors generally remain for a long period free from adhesions, but may eventually excite some degree of peritonitis, and become adherent to surrounding organs.

Natural Terminations.—In most cases the growth of a

fibroid tumor is slow, and becomes limited after a certain time, so that even a very large tumor may be borne for many years without very serious result. After the menopause, growth is usually lessened or arrested, and not unfrequently the tumor tends to diminish. Extreme diminution, or absolute spontaneous disappearance of fibroids, has occasionally been recorded, especially as the result of involution after delivery. A fibroid polypus may eventually be spontaneously detached and expelled, or may slough away. Gangrene may also affect a submucous fibroid, especially after surgical interference. If the patient survive the risk of septicaemia, the tumor may in this way be got rid of. Fibroids sometimes undergo fatty degeneration or calcification, and the resulting calcified mass has occasionally been separated and expelled. In most cases fibroid tumors do not prove destructive to life; but death may result from sloughing and septicaemia, or from haemorrhage or exhaustion, or more rarely may be brought about by the magnitude of the tumor. If a very large submucous fibroid or fibroid polypus, be expelled through the os uteri, and become incarcerated in the pelvis, death may result from the effects of pressure, or from sloughing and septic absorption. In the substance of the softer or fibro-cystic tumors, effusions of blood may take place, or abscesses be formed, and lead to a fatal issue.

Diagnosis.—Subperitoneal fibroids of small or moderate size will reveal their outlines to bimanual examination, and will usually be recognized as attached to the uterus, and movable with it. If a fibroid is reached by vaginal touch, and is about equal in size to the normal uterus, the distinction between the fibroid and the uterus must be made by the sound. If a fibroid exist in the anterior or posterior wall, producing flexion, it will still be felt as a prominence after the uterus has been restored, or its curvature reversed, by means of the sound. If a fibroid is fixed by adhesion in

the pelvis, the diagnosis is more difficult, since it may be impossible to make out its attachment to the uterus. From a small ovarian tumor it is usually distinguished by its hardness, from a swelling due to hæmatocele, peritonitis, or cellulitis by its rounded and defined outline, connected with the uterus, and not merging gradually into surrounding parts.

If the enlargement of the uterus from the presence of a fibroid be externally uniform, the diagnosis from early pregnancy may usually be made by its greater hardness, generally less globular form, less variation of consistency, as well as by absence of softening in the cervix, and the association, not of amenorrhœa, but usually of menorrhagia. In molar pregnancy, or retention of a dead ovum, these characters may fail, and even the history be delusive; but the sound will generally reveal the presence of something in the uterus, and dilatation of the cervix will clear up any doubt.

From subinvolution and hyperplasia the diagnosis of fibroid tumor can sometimes be made only after dilatation of the cervix, when the localized character of the enlargement may be detected. When, however, the uterine cavity is lengthened to more than four inches, apart from pregnancy, the existence of a fibroid is probable, and the diagnosis is confirmed if the sound shows the cavity to be distorted and displaced to one side of the centre of the uterine mass. Large interstitial fibroid tumors are generally easily distinguished from solid ovarian tumors by the fact of the tumor forming one mass with the cervix, and moving with it, and by the great elongation of the cavity of the uterus. The distortion of the cavity, however, may render it impossible to pass the sound, while, in the case of ovarian tumors, the cavity of a uterus, closely connected to the tumor, may be lengthened to as much even as five inches. Large subperitoneal fibroids may often be distinguished by their mul-

tiple character, and hard, irregular, nodular outline. Even if the tumor is single, the presumption is in favor of its being uterine, if it is solid. The attachment of the tumor to the front or back of the uterus may often be made out, either *per vaginam* or *per rectum*, especially if the cervix be drawn downward, in conjunction with bimanual examination (see p. 25). Uterine tumors also remain longer free from adhesion than do solid ovarian tumors.

Fibro-cystic, or soft fibroid tumors, are often very difficult to distinguish from ovarian, but are in general of much slower growth. If their growth enlarges the whole uterus, the sound will usually decide the point. If they are subperitoneal, the chief point of distinction is that the distinct fluctuation is generally limited to special regions, while the rest of the tumor is hard or only semi-fluctuating. If a puncture is made in doubtful cases, the character of the fluid will generally decide. In fibro-cystic tumors the fluid is usually clear, limpid, and yellowish, deposits spontaneously a coagulum of fibrin, contains albumen but not paralbumen, and under the microscope shows leucocytes or spindle-cells, but not the granular cells of ovarian fluid. In some cases the fluid may be blood-stained or purulent. For the characters of ovarian fluid see p. 260. In some cases it may be impossible to distinguish with certainty between a uterine and ovarian tumor, except by exploratory incision. If an incision be made, the dark-red color of a uterine tumor distinguishes it from an ovarian, which is paler, or has a bluish tint.

Diagnosis of Fibroid Polypi.—Care should always be taken that an inverted uterus is not mistaken for a polypus. The criteria are given under the head of Inversion of the Uterus (p. 130). Before removal of a polypus the diagnosis should always be completed by making sure that the sound will pass by the side of the pedicle up to or beyond the normal length. Difficulty may arise from the polypus having be-

come adherent to a part or even the whole of the margin of the os, but some point will almost always be found at which the sound can be forced through by moderate pressure. From a polypoid cancer a fibroid polypus is distinguished by its smooth pedicle, which can usually be traced up into the cervix; by its generally smooth surface, although it may be sloughing or ulcerated in parts; and by its less readiness to bleed on touching. Portions of retained ovum or clots may resemble a polypus within the uterine cavity, or presenting through the os, and when a portion of placenta has retained a partial connection with the uterus it has been termed by some a *placental polypus*. These are generally distinguished by the history, and by their easy removal by the finger or blunt curette.

Treatment.—In the great majority of cases palliative treatment will successfully carry on a patient up to the menopause, at which time symptoms are commonly, to a great extent, relieved, although the date of its occurrence is often in this disease deferred for several years beyond the usual period. All sources of hyperæmia, active or passive, should be avoided as far as possible, and if a patient be single, and the tumor be of any considerable size, or cause any notable symptoms, marriage should be strongly discouraged. Married women should be warned of the probably injurious effect of coitus, and in all cases special care should be enjoined at menstrual periods. Diet should be rather abstemious, and alcohol used very sparingly.

The objects to be aimed at by internal remedies are to alleviate the symptoms of hæmorrhage and leucorrhœa, and, if possible, to check the growth of the tumor or cause its diminution. The drugs which are most efficacious for the former purpose tend also, by restricting hyperæmia, in some degree to promote the latter, although it is only in exceptional cases that any notable diminution of the tumor can be hoped for. Those which have been found most useful

are, in the first place, ergot, and next to this, bromide and
iodide of potassium. Of the two latter, the bromide is more
readily borne for a long period. Half-drachm doses of the
extractum ergotæ liquidum, or Richardson's liquor secalis
ammoniatus, may often usefully be given in combination
with bromide of potassium. The most marked effects, how-
ever, of ergot are obtained when it is given subcutaneously,
as practiced by Hildebrandt, and in some cases a diminution
in the size of the tumor may thus be obtained, while the
hæmorrhage is generally more or less checked. The best
forms of ergot for this purpose are sclerotic acid, in doses of
half a grain or more ; the extractum ergotæ liquidum, in
doses of ten to thirty minims, diluted with an equal quan-
tity of water, as recommended by Dr. Atthill ; and Bon-
jean's ergotin, in doses of three to five minims, dissolved in
four or five parts of water. The great drawback to the
treatment is the risk of inflammation or abscess being pro-
duced at the point of puncture, and all the preparations are
liable to cause at least some local induration and redness.
All solutions should be freshly prepared. The drug ap-
pears to be somewhat more efficacious if injected in the
neighborhood of the uterus, and if injected deeply into the
substance of the gluteal muscles it is less likely to cause ab-
scess than it would be in the subcutaneous cellular tissue.
Hildebrandt's formula was three grains of Wernich's aque-
ous extract of ergot with seven and a half minims of glyc-
erin and the same quantity of water, but the presence of
the glycerin appears to increase the local irritation. The
injections may be made every other day. Ergot given in
any way, but more especially by injection, often increases
greatly the pain resulting from uterine tenesmus, and the
patient should be warned to expect this. Subperitoneal
fibroids are less affected by ergot than those covered by a
fair thickness of the uterine wall.

Diminution of the tumor has also occasionally been ob-

tained after the use of baths containing bromine or iodine, in combination with the internal administration of the water, but more frequently the advantage to be thus gained is limited to mitigation of the symptoms. The waters of Kreuznach or Woodhall Spa are the most to be recommended.

In case of alarming hæmorrhage, the most effectual plug is a sponge tent, which also produces a lasting good effect by dilatation of the cervix. Enlargement of the cervical canal is the first indication in case of persistent hæmorrhage, since it is a necessary preliminary to other means, and often by itself exercises an important influence. The full explanation of its mechanism is not quite understood, but among its uses are that it prevents any retention of blood or clots, and relieves tension, sometimes allowing the uterine action to carry on the extrusion of the tumor. Dilatation may be effected either by laminaria tents, of which as many as possible should be introduced side by side, or by incision. Incision is preferable if one lip of the cervix be expanded over the surface of a tumor growing from the other side of the cervix. After dilatation of the cervix, styptic applications may be used in the form of swabs for the arrest of hæmorrhage. Swabs sometimes fail on account of the tortuous and dilated character of the uterine cavity, and it may be necessary to have recourse to injections. For this purpose tincture of iodine, pure or diluted with one or two parts of water, may be used, or, if this fails, a solution of perchloride or subsulphate of iron. For the precautions necessary see p. 196. In cases of recurrent hæmorrhage the application of strong nitric acid may be tried if milder means fail.

If further surgical treatment be demanded after full dilatation of the cervix, the next step, in the case of an interstitial tumor, or one which has a very wide attachment to the uterine wall, should be to make a longitudinal incision

across the face of the tumor deep enough to divide its cap-
sule. This allows the mucous membrane to retract, and so
diminishes the hæmorrhage from its surface, while, if ergot
be afterwards persistently administered, the uterus will often
extrude the tumor through the opening.

The operation of *enucleation* is one of the most dangerous
in surgery when the tumor is interstitial or its attachment
to the uterine wall very extensive. The most favorable
cases for its application are those in which the tumor shows
some tendency to become pedunculated, so that its surface
of attachment is less than its greatest diameter ; but it al-
ways involves a considerable risk of septicæmia and peri-
tonitis, and should not be undertaken unless symptoms are
urgent and other means have had fair trial. An indispen-
sable condition is that the tumor should be covered by a
sufficient thickness of uterine wall to allow it to be separated
without risk of opening the peritoneal cavity.

Unless the vagina be already capacious, it should be ex-
panded by repeated plugging or the use of dilating bags, so
as to allow it to admit the whole hand if required. The
cervix should also be fully dilated. The uterus is then
pressed down by an assistant, and an incision made through
the capsule of the tumor. If there is any constriction round
its base the incision should be made transversely at this
margin, otherwise a crucial incision should be made over
its centre, and the tumor separated by the fingers from its
capsule. Powerful vulsellum forceps should then be fixed
into the tumor and traction made upon it, while its base is
separated from the uterine wall by the fingers or by some
blunt instrument, of which the best is one made in the form
of a blunt-ended spoon, with serrated edges and a very
strong handle. If the tumor is interstitial, or has no con-
striction round its base, it is better, after making the cru-
cial incision and partially peeling off the capsule, to leave
the uterine action to carry on the extrusion. When the

vitality of the tumor is impaired and spontaneous enucle-
ation has commenced, or has advanced up to a certain point,
after having been artificially commenced, the removal may
be completed by *avulsion*, in which operation the tumor is
seized by strong forceps and dragged away from its bed by
combined traction and rotation.

In the case of an irremovable fibroid there is yet another
method of inducing a process of sloughing, which may be
followed by a spontaneous enucleation through the artificial
aperture. This is to burn a cavity in the tumor by the ac-
tual, benzolin, or galvanic cautery, a plan which Dr. Green-
halgh has found efficacious. It is most applicable to those
fibroids which grow in the wall of the cervix.

If the tumor so far approximate toward the pedunculated
form that a wire loop can be securely applied around its
base, the best mode of removal is by means of the galvanic
écraseur, provided the battery power is fully adequate to
heat a loop of sufficient size while in contact with moist
tissues. The ordinary écraseur is apt to fail by breaking
off the wire, if not from the yielding of the stem of the in-
strument, in the attempt to divide such a broad surface of
dense tissue. A tumor of such a shape, if of moderate size,
may, however, sometimes be cut away with curved scissors,
the cautery being used afterwards to check bleeding if re-
quired. But if the symptoms are not of great urgency it is
generally preferable to wait awhile, and administer ergot
until the tumor has become more completely polypoid.

It sometimes happens that a fibroid of very large size be-
comes partially extruded by uterine action into the vagina,
or even appears at the vulva. The base of attachment may
still remain large, and it will generally be impossible after the
os has become retracted, to determine its dimensions by any
method of sounding. Sometimes it is not possible even
to reach any point of the margin of the dilated os. This
condition is distinguished from inversion of the uterus by the

great size of the mass in the vagina, and by recognition of the
fundus in its normal direction, but carried upwards by pres-
sure.   The functions of the bladder and rectum then become
impeded, and if the pelvis is completely filled, nervous symp-
toms may arise similar to those resulting from impaction of
the fœtal head in parturition.   In any case, the patient is
exposed to the risk of septicæmia from sloughing of the tumor.
The most perfect treatment is, if possible, to get the loop of
the galvanic écraseur up to the base of the tumor.   This
may sometimes be effected by using the separable tubes of
the galvano écraseur like Gooch's canulæ.   The tubes, car-
rying the wire, are passed up side by side posteriorly, till
their extremities are above the equator of the tumor.   One
is then brought round at each side till they meet again in
front, and the écraseur-stem is finally passed over both tubes
and the ends of the wire fastened.   If the straight tubes
cannot be passed up high enough the object may sometimes
be gained by using in their place two gum-elastic catheters,
having holes made near their ends, through which the wire
is passed.   The catheters are then suitably curved, and by
aid of their stylets, are made to carry the loop into place.
Finally, the stem of the écraseur is passed up in front over
the ends of the loop, the stylets are withdrawn, and the
wire, when heated, cuts through catheters and tumor to-
gether.   If the base of the tumor cannot be reached by
either expedient the loop may be passed as high as possi-
ble, and the growth removed in successive slices.   But for
this purpose, in the case of a very large tumor, sufficient
battery power to heat a loop twelve inches in circumfer-
ence may be required, and most of those used for medical
purposes do not attain to this capacity.   When the base of
the tumor is very broad and dense, the ordinary écraseur
may prove useless, even when its loop can be applied ; and
it appears rather to increase the danger if a ligature be
placed round the base, or the écraseur tightened as far as
it will go and left in place.   In the absence of a galvanic

cautery of sufficient power, it is preferable to wait for spontaneous sloughing and cut away the tumor gradually with scissors, as it becomes softened, using antiseptic injections meanwhile. But there are cases in which the galvanic écraseur alone can save life.

When a fibroid tumor, which cannot be removed through the vagina without too great a risk, causes such severe hæmorrhage as to threaten life, or render life intolerable, one resource remains short of removing the whole uterus by gastrotomy, namely, the operation of *spaying*, which has been performed in such cases by Trenholme, Hégar, and others. The object of this operation is to bring on artificially the menopause, and in the majority of cases this has been attained. In some instances indeed more or less regular hæmorrhage has persisted for a time, but it has been found more amenable than before to the influence of cold and other styptic remedies, which after removal of the ovaries may be freely used without fear of the ill results of checking menstruation. The operation should be performed like ovariotomy according to Lister's antiseptic method in its fullest extent. A small incision is made in the median line, the mesovaria are transfixed by carbolized silk ligatures, which are cut short and dropped, and both ovaries are cut away. The operation is less dangerous than that of spaying in the case of adherent and degenerated ovaries, and hitherto its results have been promising.

Subperitonial fibroids are amenable to no surgical treatment except *removal by gastrotomy*, but, since they are as a rule comparatively innocuous in their results, this operation should only be undertaken when, by their increase in size, they directly threaten life, or absolutely incapacitate from its necessary avocations. Such a dangerous increase is more likely in the case of the softer or fibro-cystic tumors. When a fibroid tumor has a thin pedicle, and is free from important adhesions, it may be removed without much greater risk than that of ovariotomy, but it is often impos-

sible to ascertain beforehand the extent of its attachment to the uterus. The operation should be performed like ovariotomy, and the pedicle or pedicles transfixed and tied with carbolized silk.

Hysterotomy, or the removal by gastrotomy of the whole uterus when enlarged by fibroid or fibro-cystic disease, is a much graver matter, and as yet the majority of cases have been fatal, although Péan reported in 1873 seven cures out of nine cases of operations performed by himself. It is possible, however, that through the success of the antiseptic method in abdominal surgery, the position of the operation may in future be much changed. The great danger lies in the bulk and vascularity of the pedicle formed by the cervix and broad ligaments, and consequent risk of primary or secondary haemorrhage. As the operation has hitherto been performed, the essential condition for its possibility is that a sufficient portion of the cervix should be free from the growth to be converted into a pedicle. Péan's method is to transfix the cervix by a strong double wire, each half of which is tightened and held fast by Cintrat's serre-noeud, an instrument like a short écraseur. He then secures the pedicle externally by transfixing it with large pins. In some cases a large clamp may be made to hold the pedicle. With the antiseptic method, however, it appears preferable to transfix the broad ligaments, and tie them in two or more sections below the ovaries with carbolized silk, then to transfix and tie the cervix itself in the same way, taking care that all the ligatures interlace. The ligatures are then cut short, the pedicle is dropped, and the wound closed. It is possible that the method of Freund for removing the cancerous uterus (see p. 232) may prove applicable to cases of fibroid enlargement, when the cervix cannot be made into a pedicle.

Treatment of Fibroid Polypi.—Removal by the écraseur is preferable to cutting away the polypus with scissors, since the latter method is not absolutely free from the

risk of serious subsequent hæmorrhage. The method
of ligature, which involved the danger of septic absorption,
is now obsolete. The écraseur itself, and the thickness of
the wire, should be in accordance with the size of the
polypus. It is convenient to have an instrument with a
very strong stem, into which terminals of various sizes can
be screwed (Fig. 54). The wire-rope, made
up of several strands of steel wire twisted,
is generally most convenient, since it is
more pliant, and more easily manipulated
than a single wire of the same strength,
and, if drawn in from one end only, it cuts
by a sawlike action. When the polypus
has passed through the os, the application
of the noose is generally easy, and may be
managed by the fingers without any specu-
lum. The tip of the stem should eventually
be passed up within the cervix, and the
slack part of the wire drawn in before it is
finally attached to the travelling button of
the écraseur, the other end having been
previously secured to the transverse bar.
If a small portion of the pedicle be left, it
generally shrinks up after removal of the
main growth. An anæsthetic should not
be given for this operation, if it is possible
to avoid it, for dividing the pedicle of the
polypus gives little or no pain, while pain
is severe if the uterine wall be included in
the loop, and thus an error may be revealed
at the last moment. If a polypus is very
large, difficulty may arise in its extraction,
after division of the pedicle. In the ab-
sence of forceps specially constructed for
the purpose, delivery may sometimes be
effected by midwifery forceps, or preferably,

FIG. 54.

Hicks's Wire-rope
Ecraseur.

by passing the loop of the écraseur again over the polypus, and so dividing it into pieces.

If the polypus be within the uterus, the cervix must be fully dilated before removal is attempted. In order to pass the loop of an écraseur over an intrauterine polypus, it is desirable to depress the uterus as much as possible by drawing down the anterior lip of the os with tenaculum forceps, while an assistant presses it down from above. It is often useful to fix a tenaculum in the polypus itself, make some traction by its means, and then pass the loop over the handle. Care must be taken, however, not to produce in this way partial inversion of the uterus, and the traction should therefore be relaxed before the écraseur is tightened.

Polypoid elongations growing from the os are easily removed by the écraseur, or, if their base is broad, they may be cut off with scissors, and the bleeding either stopped by cautery or by application of a styptic and plugging of the vagina.

CANCER OF THE CERVIX UTERI.

Causation.—Cancer of the neck of the uterus is a very common disease. It is more frequent even than cancer of the breast, and is the chief cause of the greater prevalence of cancer in the female than in the male sex. It most commonly occurs between the ages of forty and fifty, but a considerable proportion of cases are also met with between thirty and forty, while a few appear before the age of thirty, and others occur even up to an advanced old age. Cancer of the cervix is extremely rare in virgins, and commoner among parous than among nulliparous women, while among the subjects of it a considerable number of women are found who have had large families. From this it may be inferred that inflammation of the cervix, induced

by parturition or other mechanical causes, plays an important part in the causation of cancer, and that the so-called erosion or granular inflammation near the os, or within the cervical canal, may eventually, *in predisposed subjects*, go on to malignant degeneration, although in any given case of this common affection such a termination is an improbable one. This view is confirmed by the researches of Ruge and Veit (see p. 168), who found that in so-called erosion a gland proliferation takes place, and that cancer may commence with a similar proliferation, with the addition of an exuberant growth of epithelium, partially or wholly filling up the acini. That constitutional predisposition is also an important element in the origin of cancer of the cervix is shown by the comparative immunity of negroes, though it is not to be inferred from this that the disease may not be purely local at its commencement. Predisposition to cancer in individual families has also some influence, although it is only in a minority of cases that a history of this can be traced.

Pathological Anatomy.—Using the word cancer in its widest sense to signify a growth having the clinical characters of malignancy, namely, that it tends to spread by contiguity into tissues of a different character from that in which it originated, to return after removal, and to infect the glands and distant organs, we must include among the varieties of cancer affecting the cervix—(1) true carcinoma, having a more or less alveolar structure ; (2) epithelioma, or the " cancroid " of German writers ; and (3) many forms of sarcoma.

There are three possible modes of origin of true carcinoma in the cervix—(1) from the proliferation of the epithelium of glands, either primarily existing or formed by ingrowth of cylindrical epithelium into depressions under the influence of irritation ; (2) from ingrowth of columnar processes from the deeper layers of the squamous epithelium

of the cervix, a process which gives rise in the first instance to epithelioma; (3) from proliferation of the connective-tissue cells and their transformation into groups resembling epithelial cells. It is at present, however, a matter of dispute whether carcinoma ever originates in the third method. It is an undoubted fact that it spreads at its circumference by the connective-tissue cells becoming infected by a kind of spermatic influence, and growing into clusters of epithelium-like cells. The very commencement, however, of growths in connective tissue is scarcely open to observation, and it is possible that some primary proliferation from an epithelial structure always occurs, as is now held by Billroth, Waldeyer, and others.

In carcinoma affecting the cervix, the proportion of cells to fibrous trabecular tissue may vary in any degree, from the most rapidly growing medullary carcinoma, consisting almost entirely of cells, up to the scirrhous form. The occurrence of scirrhus at all approaching in hardness to that which is found in the breast is, however, very rare, although the more infiltrating form of carcinoma often contains enough fibrous tissue to give an impression of considerable hardness to the finger. Medullary carcinoma is the commonest form of all, and the varieties which are harder at first generally become softer in their later stages. The variety of carcinoma is sometimes found in which the cells are arranged in a columnar manner round the borders of the alveoli. More frequently the alveoli are very small and irregular, often elongated in shape, and each containing only a few cells, so that, especially near the growing margin, the growth may be difficult to distinguish from a round-celled sarcoma. In the more rapidly growing varieties, again, the alveoli are so large that the cell-masses may be pressed out from the cut surface in the form of soft plugs.

Epithelioma is not unfrequently found, although the oc-

currence of bird's-nest bodies is comparatively rare. When they do occur they indicate the commencement of the growth from squamous epithelium. Epithelioma of the cervix does not, as is generally the case on cutaneous surfaces, remain true to its own character as it advances, but often merges into carcinoma. Thus typical bird's-nest bodies may be found at one part of a growth, and at another a complete alveolar structure.

Around the carcinoma or epithelioma in its early stages, there is a growth of tissue, rich in nuclei, which may show the elements of myoma or sarcoma, or a combination of the two, and is sometimes comparatively considerable in extent. As to the relative frequency of the different varieties, Mr. Arnott reports fifty-seven cases in which autopsies were made at the Middlesex Hospital. Of these the structure was clearly made out on microscopic examination in twenty-two, of which twelve were carcinoma, eight were epithelioma, and two spindle-celled sarcoma. Out of fifteen cases in which I amputated the cervix at an early stage I found that five had the structure of carcinoma, three of epithelioma, one of round-celled sarcoma, while six appeared to be intermediate between epithelioma and carcinoma, or showed the characters of each at different parts.

By the name "*cauliflower excrescence*" has been generally understood a sprouting, papillary growth from the cervix, readily bleeding, and so soft that after its removal or after death nothing but a broken-down pulpy mass, like a macerated placenta, may remain. Some have supposed this to be a special form of disease, and not necessarily malignant. Villous outgrowths, however, may be associated with different forms of growth in the subjacent tissue. Commonly the individual papillæ contain a central loop of vessels supported by delicate areolar tissue, and their substance consists mainly of round cells, though the superficial layers may be flattened. The cellular portion of the papillæ is

generally continuous with the cell-masses of a carcinoma or epithelioma in the subjacent tissue, and the fibro-vascular tissue with the fibrous trabeculæ of the carcinoma, or the nucleated areolar tissue surrounding the cell-masses of the epithelioma, as the case may be. In one case I have found the papillæ to contain numerous bird's-nest bodies. In other cases the individual papillæ themselves show the alveolar structure of medullary carcinoma. The papillæ may sometimes adhere by their outer surfaces, and thus form inclosed spaces. Cases have been recorded in which the structure was merely that of papilloma, and no evidence of malignancy could be detected. But the friable growths are probably always malignant, the epithelium tending to invade the subjacent tissues at the points intervening between papillæ. A strong tendency to outgrowth may, however, be associated with a very slight tendency to infiltrate; and, in such case, the growth may be eradicated completely by removal, and never recur. Friable growths of this kind are rare, but the term "cauliflower excrescence" has also sometimes been applied to the commoner and less pulpy outgrowth of the cervix, the surface of which is only slightly papillary, and which has a nearer actual resemblance to a cauliflower than the growth to which the name was first given. The structure of these tumors is more frequently medullary carcinoma, though they are often clinically described as epithelioma.

In the great majority of cases cancer of the cervix commences near the external os, and extends thence throughout the cervix, and upward along the cervical canal, generally affecting one lip of the os more than the other. Exceptionally it commences high up in the cervical canal, near the internal os, and the external part of the cervix may then show no sign of it for a considerable period. At the advancing border of the growth the subjacent tissue generally becomes infiltrated before the mucous membrane

is affected, the normal squamous epithelium being simply thickened, and ending abruptly where the diseased surface is reached. In some cases of epithelioma the rete Malpighii shows ingrowing processes near the border, but this is never observed over such a considerable surface as in epithelioma of the skin.

The growth rapidly extends up the cervical canal to the internal os, and to the vaginal walls and cellular tissue around the cervix, thereby fixing the uterus. In its further advance it involves chiefly the body of the uterus and the anterior and posterior vaginal walls, usually descending furthest along the former. Sometimes the posterior vaginal wall in contact with the cervix becomes infected by contiguity, in the case of vegetating growths. Ulceration generally occurs early, with extensive sloughing of the morbid deposit, and the greater part of the uterus and vagina is often eaten away, so that a deep ragged cavity is formed. Perforation frequently occurs into the bladder and more rarely into the rectum, so that an enormous cloaca may be formed of the three cavities. Metastatic deposits may occur in the pelvic and lumbar glands, ovaries, peritoneum, and also in distant organs, as the lungs and liver, even in the case of spindle-celled sarcoma, the least actively malignant of the various forms of growth. Mr. Arnott found metastatic deposits in the glands in 50 per cent., in other organs in 41 per cent. of his cases. The growth often interferes with the ureters, leading to wasting or inflammation of the kidneys, and may even entirely occlude them.

Rodent ulcer of the cervix has been described as a disease distinct from cancer, and marked by its slow progress, and the absence of any perceptible amount of deposit, but recent investigations of its histology are wanting. Probably at least many cases so described have been instances of super-

ficial epithelioma, in which ulceration preponderated over infiltration.

Results and Symptoms.—In the early stages of cancer the symptoms are frequently so slight that the disease commonly does not come under observation until it has reached a stage at which it is ineradicable. When an early symptom occurs it is usually that of hæmorrhage, often not profuse, but irregular, and frequently recurring. Hæmorrhage on coitus is not unfrequently the first symptom. Menstruation is also increased, and leucorrhœal discharge is generally present, sometimes slightly tinged with blood. A recurrence of uterine hæmorrhage, after the menopause has for some time passed, should always lead to the suspicion of cancer, and be regarded as an imperative indication for a vaginal examination. Early symptoms are more commonly present in the vegetating than in the infiltrating forms of cancer; in the latter of which there may be no hæmorrhage up to quite a late stage. Pain is usually absent or slight while the disease is confined to the cervix, and in some cases of soft cancer very little is felt up to quite an advanced period of the disease. In most cases, however, as soon as the growth has infiltrated the tissues round the uterus, severe lancinating pain is a marked feature, and renders cancer of the cervix one of the most terrible of diseases. It may generally be distinguished from the pain of chronic inflammation or engorgement from the fact of its being felt severely at night, and disturbing sleep, while the other is chiefly evoked by standing or locomotion, and is relieved by rest. Pain is also produced in cancer by the soreness of the ulcerated surface, exposed to friction, and, when of this nature, it may be much relieved after removal or destruction of the diseased surface.

As soon as ulceration has commenced, the discharge has generally a watery character, often tinged with blood, and soon

acquires the most intense fetor, which forms not the least among the sufferings of the unfortunate patient. Frequently shreds of gangrenous tissue come away with it. At the outset the patient may be apparently in the most florid health, but as soon as the ulcerative stage is reached cancer of the cervix very quickly induces loss of flesh and the well-known cancerous cachexia. As displayed in this form of cancer it depends, in great measure, upon the effect of repeated hæmorrhages, and upon a constant slight absorption from the foul discharges. Thus a great improvement may be effected in the general appearance by partial removal of the growth, leading to a temporary cessation of hæmorrhage and fetid discharge. The cachexia shows itself mainly in a sallow, yellowish tint of skin, accompanied by emaciation, but this does not present anything absolutely characteristic ; and a very similar appearance may be seen in other cases, especially in those of fibroid tumor or polypus, accompanied by hæmorrhage and sloughing. Digestive functions are impeded, and nausea and vomiting are frequent, being partly the effect of the disgusting smell of the discharge. Obstinate constipation may result from mechanical interference with the rectum, while occasional attacks of diarrhœa from reflex irritation are not unfrequent. Disturbance of the bladder occurs pretty early, and may be the first symptom which attracts attention. At first there may be reflex tenesmus, then difficulty of micturition as the base of the bladder and the urethra become involved, and finally incontinence, from the existence of a fistulous opening.

The duration of the disease commonly varies from one to two years after the recognition of its character ; more rarely the patient survives for three or four, or even a greater number of years. Very rare instances have been recorded in which an apparent spontaneous cure has resulted after

sloughing of the growth. If the growth can be removed the course of the disease is much prolonged, and it is doubtless possible to eradicate it entirely in some cases, if the operation can be performed early enough. Death occurs sometimes directly from hæmorrhage, but more frequently from gradual exhaustion and emaciation, aided not unfrequently by the effects of uræmia or kidney inflammation. Intercurrent peritonitis or pneumonia may close the scene, or death may occur rapidly from occlusion of the ureters, or suddenly from pulmonary embolism.

Diagnosis.—When the disease has reached the ineradicable stage, the diagnosis should be easy, although mistakes have not unfrequently been made. The cervix is fixed, and dense inelastic induration may extend to the vaginal walls. In the hard mass is felt an ulcerated cavity with hard nodular edges. Its surface gives to the finger a peculiar sensation of superficial friable softness, with extreme inelasticity of the tissue beneath. Hæmorrhage is generally produced by touching the surface of the ulcer. The fetor of the discharge is a ready diagnostic sign in the later stages. In endometritis or vaginitis the discharge may be offensive enough to annoy the patient, but the intense and nauseating smell, hardly to be removed from the fingers even by disinfectants, belongs only to cancer, and to the decomposition of the products of conception, or the sloughing of a benign tumor, such as a fibroid or polypus. The two latter conditions can usually be easily distinguished by the history and physical signs.

In the proliferating forms of cancer, the growth often attains considerable size before the cervix becomes fixed. There is then an unequal enlargement of one or both lips of the cervix, not nearly so hard to the touch as chronic hyperplasia. The surface is more or less villous or papillary, and readily bleeds on manipulation. The whole cer-

vix is broadened, and tends to grow into a mushroom-like shape, with eversion of its edges—a valuable diagnostic sign. By speculum a bulging, irregular, mottled, deep red surface of more or less extent is seen, which is destitute of the normal squamous epithelium. The speculum, however, should be used with great caution in cases of cancer of the cervix, on account of the severe hæmorrhage which it may induce. When it is required for diagnosis, or the application of remedies, it is usually best to employ Neugebauer's speculum (Fig. 8), the first blade of which can be guided past the cervix by the finger. Nothing but the microscope can decide whether the growth be carcinoma or epithelioma, since both may have a papillary or villous surface. The exceedingly friable, villous, ready-bleeding surface of the true cauliflower excrescence can scarcely be mistaken for any other condition.

The diagnosis of the earliest stage of cancer may be one of very great difficulty. The most valuable assistance is to be found in the fact, that it usually commences *on the surface* near the os, or just within the cervical canal, and is associated with some degree of papillary growth, which leads to ready hæmorrhage on manipulation. If bleeding is produced by a gentle touch of the os by the finger, and not merely by rough handling, or the use of the speculum or sound, the suspicion of commencing cancer should be excited, especially if any papillary surface or inelastic nodules are felt around the os. Villous erosions, however, may also sometimes readily bleed, and the only certain method of distinguishing is to remove a portion of tissue by scissors or sharp spoon, and examine it microscopically.

Hyperplastic induration of the cervix has, formerly, often been mistaken for cancer. It may be distinguished by the fact that the cervix is movable (unless fixed by inflammation); its irregularity is due to fissures radiating from the

os, and its tissue has some elasticity with its hardness, while pain is usually increased during the menstrual flow, instead of being relieved by hæmorrhage, as is commonly the case in cancer. Generally, also, there is no irregular hæmorrhage, and menstruation is scanty rather than profuse. In hyperplasia there is commonly a history of symptoms referable to uterine disorder of many years' duration, while the symptoms of early cancer are not likely to have existed many months. It is to be remembered, however, that cancer may supervene upon disease of a non-malignant kind.

Treatment —If the disease is recognized before the uterus is fixed, no time should be lost in attempting to eradicate it by removal. Even though it usually recurs, the patient is relieved for a considerable period from hæmorrhage and discharge, and the course of the disease is much protracted. When the cancer forms a prominent mass, the operation is very easily performed by the galvanic écraseur. It is usually most convenient to adjust the loop by the fingers without any speculum, the stem of the écraseur—which should not be too short—being passed up in front of the cervix, and pressed somewhat upwards as the wire is being tightened. Caution should be used as to drawing down the cervix with a tenaculum, since otherwise a portion of the pouch of Douglas or of the bladder may be brought within range of the loop. It is better, therefore, to apply the loop with the cervix in its natural position; but after the wire has begun to cut for itself a groove, some traction may be made upon the cervix, in order to bring as much as possible of the cervical canal below the plane of section, so that the stump remaining is represented by a cone, with its apex towards the fundus. In the absence of the galvanic cautery, the amputation may be performed with the wire écraseur. It is well to apply afterwards the actual or benzoline cautery, even if there is no bleeding, in order to destroy, to a greater

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depth, the tissue to which cancerous infiltration may have extended. After the operation, antiseptic vaginal injections should be used until the superficial slough has separated. The cautery protects, to a considerable extent, against the absorption of septic material; but a certain amount of local inflammation, producing thickening around the uterus, is not uncommon after amputation of the cervix in cancer.

The rule of abstaining from operative interference when it is impossible to remove the disease wholly does not apply so much to cancer of the cervix as to that of other parts of the body, since a large part of the cachexia, whether due to hæmorrhage or septic absorption, depends upon the presence of the diseased surface in a situation exposed to friction and subjected to the influence of warmth and moisture. Whenever hæmorrhage is an urgent symptom, and a vegetating surface exists, removal of a portion of the growth will often arrest hæmorrhage and do away with the fetor of the discharge for a considerable period. This may be carried out whenever the disease is not so advanced that a risk would be run of opening the peritoneal or other cavity. Any prominent mass round which a wire can be placed may be sliced off by the galvanic écraseur. To remove the deeper tissue the best instruments are the sharp spoons introduced by the late Professor Simon (Fig. 55), which are made of various shapes and sizes. In scraping away the tissue by their means a selective action is exercised, since the cell-masses of the cancer are readily removed, while the normal tissue is more resistant. The selective action will not extend, however, to the infiltration of scattered cells among normal tissues outside the borders of the growth, while, for the harder forms of cancer, containing a large proportion of fibrous tissue, these spoons are less effective. Caustics may also be used, either in the first place, or, preferably, after the more friable and manifestly cancerous

tissue has first been scraped away. We may then employ either the actual, benzoline, or galvanic cautery, or chemical agents, as the potassa fusa, potassa cum calce, or alcoholic solution of bromine. Potassa fusa or potassa cum calce must be used with the precautions previously described. The solution of bromine, first recommended by Routh, and very highly lauded by Schrœder, is supposed to exert a special influence upon cancer cells, and is certainly an efficient caustic. One part of bromine dissolved in five parts of rectified spirit* may be applied on a tampon of cotton-wool. This should be covered with a piece of gutta-percha skin, and a larger tampon soaked in carbonate of soda placed in the lower part of the vagina to protect the intact mucous membrane by neutralizing the bromine which escapes. If the vagina be sufficiently protected, the caustic may be left in place from six to twelve hours. The application may be repeated, if necessary, and if hard nodules of cancer be afterwards detected, the same solution may be injected into their substance by a syringe, like a hypodermic syringe, but provided with a long nozzle, and a slough so produced.

After removal by the écraseur of a cancer apparently confined to the vaginal cervix, sections should always be made of the piece removed, and if a milky juice can be scraped

Simon's Sharp Spoon for Scraping Cancer.

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* The mixture should be made cautiously, and care should be taken not to inhale too much of the fumes, which are irritating to the lungs, and may even damage the sense of smell.

from the surface up to the plane of section by the wire, or if the microscope shows the cancer to have extended so far, the stump should be scraped out with the sharp spoons, and bromine or other caustic afterwards applied. In several cases thus treated, after the first section had failed to remove the whole of the disease, I have found that from one to three years afterwards there was no sign of local recurrence, although in two cases the cervix had closed by gradual contraction, and an operation became necessary to evacuate retained menstrual fluid.

Dr. Marion Sims has lately proposed to excise the cervix more completely than has hitherto been attempted. His method is to cut out a wedge-shaped portion by means of his own uterine knife (Fig. 17), going up to or above the internal os, if required. The operation is performed with the aid of Sims's speculum, and the semiprone position, the cervix being held firmly by a tenaculum. A cautery should be in readiness to check hæmorrhage, if required. This operation would fail if the disease had reached the outer margin of the cervix, but since it is usual for the disease to reach a higher level along the cervical canal than at the outer part of the cervix, it may succeed in removing the whole of the cancerous tissue in cases in which the ordinary removal by écraseur would fail. With a similar object I have sometimes cut a groove upwards from the vaginal junction all round the cervix with the knife, scissors, or galvanic cautery, and afterwards applied the wire loop at the bottom of the groove.

An operation offering far more hope of radical cure, if performed while the uterus is still freely movable and the vagina unaffected, is the *extirpation of the whole uterus.* This was performed through the vagina by Dr. Blundell and others, and has lately been revived, with more hopeful prospects, by Freund, of Breslau, who has introduced a carefully devised method for performing the operation by

gastrotomy. Carbolic spray is used at the operation, and the vagina and cavity of the uterus are disinfected by a ten per cent. solution of carbolic acid. An incision is made in the linea alba, as for ovariotomy, and the intestines are drawn up out of the pelvis, and held in a soft linen cloth soaked in a warm solution of carbolic acid. If the body of the uterus is healthy, a strong ligature is passed through it, whereby to draw it upwards, but if diseased, it is seized by fenestrated forceps, the blades of which hold it firmly without lacerating it. The broad ligament on each side is then secured by ligatures in three loops. In order to avoid transfixing those portions of the broad ligament where large veins exist, the upper loop is passed through the substance of the Fallopian tube above and through that of the ovarian ligament below. The middle loop transfixes the ovarian ligament above and the round ligament below. To pass the lowermost loop, an empty needle, immovably mounted upon a handle, is first passed from the vagina into the peritoneal cavity in front of the broad ligament and anterior to the uterine artery, the exact position of which is made out by bimanual examination. The needle is then threaded, withdrawn into the vagina, inserted again at a point not far from the first, and passed into the pouch of Douglas behind the broad ligament, and the thread so drawn upward into the abdomen. Finally the loop is completed by transfixing the broad ligament from behind forwards, the ligature being passed through the substance of the round ligament.

After the ligatures are placed the peritoneum between uterus and bladder is divided by the knife. The anterior surface of the uterus is then separated from the bladder by the fingers or handle of the knife, the fundus uteri being meanwhile drawn by an assistant upwards or backwards as required by means of the transfixing ligature or forceps. As soon as the anterior vaginal cul-de-sac appears as a reddish fold in the bottom of the wound between uterus and

bladder, it is perforated from the vagina by a guarded knife, and the opening enlarged to both sides. One or two fingers are then passed from above through the wound into the os uteri, and the cervix is gradually drawn upward by their means, until the posterior vaginal cul-de-sac is fully exposed, and the position of the ligatures seen. The incision can then be carried round the cervix, so as to sever the uterus completely, without risk of dividing the lowest loop of ligature, or injuring the ureters.

The uterus is thus removed through the abdominal wound. If, however, there is any open cancerous surface of the cervix likely to contaminate the peritoneum, either the cervix is to be amputated previously, or all ragged tissue scraped away, and the wound touched with the cautery or strong carbolic acid. It might be better, however, in such cases to remove at any rate the lower half of the uterus through the vagina. After the uterus is detached, all the ligatures, which are left long, are carried down through the aperture into the vagina, and strong traction is made upon the uppermost ligatures, to which small rods have been previously attached to distinguish them. In this way an inversion of the borders of the wound is produced, so that the ligatured stump of the broad ligament on each side presents in the vagina, and the uninjured portions of the anterior and posterior layers of pelvic peritoneum fall together in a transverse fold. The two layers are then united at this level by sutures, so as to shut off completely the peritoneal cavity. A plug soaked in carbolized oil (ten per cent.) is then placed in the vagina, by which canal the ligatures also are brought out. They are generally detached by about the fourteenth day.

Out of his first ten cases Freund reports five recoveries from the effects of the operation, a result sufficiently favorable to justify its further trial in such a disease as cancer of the cervix, although experience has yet to show how far re-

currence of the cancer is likely to take place. The same operation is applicable to cancer of the body of the uterus in its earlier stages.

Palliative Treatment.—In a considerable proportion of cases of cancer of the cervix there is no hope of benefit from even a partial removal of the growth. In the slower and more infiltrating forms of the disease, with little tendency to vegetation, hæmorrhage may often be kept in check by occasional application to the ulcerated surface of somewhat milder caustics than hitherto mentioned, such as strong nitric or carbolic acid, or a saturated solution of chromic acid. When the disease is too extensive and ulceration too far advanced to allow any stronger caustic to be used, the condition of the surface may often be improved, and hæmorrhage and fetor be diminished, by the occasional application of the dried sulphate of zinc in powder. This may be kept in place by a tampon of cotton-wool, and left from twelve to twenty-four hours. If hæmorrhage is severe, the liquor ferri perchloridi fortior, which acts as a caustic of moderate strength, as well as a styptic, or a saturated solution of the solid perchloride of iron in glycerin, diluted with half its bulk of water, may be applied from time to time. Besides the stronger caustic applications, great benefit may be derived from the constant use of astringent and antiseptic solutions, by which the surface of the growth is hardened. As an astringent and antiseptic combined, from one to two drachms each of tincture of iodine and of solid perchloride of iron, dissolved in a pint of water, form, perhaps, the most useful lotion. As simple astringents, alum, iron alum, or acetate of lead, may be used. As an antiseptic permanganate of potash is of little avail. Carbolic acid is perhaps the most powerful, but weak solutions of iodine or bromine, or a lotion containing two drachms to the pint of liquor sodæ chloratæ, or liquor calcis chloratæ, are also effective.

As regards the general treatment, total sexual abstinence should be strictly enjoined, diet should be light, and stimulants should be avoided, or used sparingly. Internal remedies do not exercise much control over hæmorrhage, but ergot and gallic acid may be of service in conjunction with local measures. In most cases, as the disease advances, the most urgent indication is to alleviate pain. In the earlier stages hyoscyamus with camphor, cannabis indica, especially in the form of chlorodyne, belladonna, or conium, may be tried, but generally their effect is not to be compared with that of opium and its alkaloids, and their chief use is for those cases in which the latter are not well tolerated. If opium and morphia are not well borne when taken by the mouth, they will often answer in the form of suppositories or subcutaneous injections. Battley's liquor opii sedativus or nepenthe is generally the most suitable form of opium for protracted use. The dose should not be increased too quickly at first, but, in a fatal disease, there should not be too much reluctance to establish an opium habit, and very large doses may be required before the close. Care should be taken at the same time to regulate the bowels, and secure that the fæces are soft. The general cachexia may be combated in some degree by tonics, especially quinine and iron, and gastric remedies are often required to alleviate indigestion.

CANCER OF THE BODY OF THE UTERUS.

Causation.—Cancer of the body of the uterus, while very much less frequent than that of the cervix, is yet not extremely rare. It does not show the same preference as cancer of the cervix for married women, and those who have had many children, but is, on the contrary, more common in the nulliparous. True carcinoma of the body of the uterus occurs later in life than that of the cervix. It is rare under 40, and commoner between 50 and 60 than between

40 and 50. Sarcoma, however, occurs with a relatively greater frequency during the period of sexual activity.

Pathological Anatomy.—There are two chief forms of cancer of the body of the uterus, namely, true carcinoma and sarcoma, of which the latter is generally regarded as being much the most frequent. The round-celled sarcomata have clinically all the characters of malignancy, although their course is generally not so rapid as that of medullary carcinoma. Even the spindle-celled sarcomata, though much slower in growth, and deviating less from benign tumors, may lead to metastatic deposits in distant organs. Of sarcoma of the body of the uterus there are two varieties. The first, which is more frequently of the spindle-celled kind, arises in the muscular walls of the organ, often from degeneration of a fibroid, but is never encapsuled. It may grow into a polypoid form, and be only distinguishable from an ordinary fibroid polypus by its microscopic structure, and by the fact of its recurrence. Such tumors are described by the older writers under the name of " recurrent fibroid." More or less of muscular tissue may be contained in them, their structure being that of myo-sarcoma, or fibro-myo-sarcoma. The second variety of sarcoma grows from the internal surface, and is usually of the round-celled kind, probably having its origin in the round or elongated connective-tissue cells of the mucous membrane. It rapidly assumes a fungating character, and rapidly breaks down, leading to hæmorrhage and fetid discharge, and so assuming an obviously malignant character. True carcinoma may commence from the uterine glands, which at first may simply extend deeply into the tissue, while the glandular acini retain their character. Then proliferation of the epithelium takes place, filling up more or less the lumen of the acini; the cells lose their character of cylindrical epithelium, becoming heaped up irregularly. Clusters of similar cells begin to form in the parenchyma around, or migrate

thither from the acini, and thus the growth degenerates into carcinoma, a more or less alveolar arrangement being eventually produced. In some cases the growth may retain, in great measure, the character of gland tissue, resembling the growths to which the title of cylinder-epithelioma or glandular carcinoma has been applied, and which are found in the alimentary canal, and sometimes even appear in distant organs by metastasis. It is probable that true carcinoma may also have its origin in the parenchyma of the uterus; but this question must be regarded as yet open to doubt. As in other organs, the carcinoma may either take the form of more or less isolated nodules, or may infiltrate the whole organ diffusely.

Results and Symptoms.—In all forms of cancer of the body of the uterus the main symptom is hæmorrhage. Fetid discharge occurs in carcinoma and round-celled sarcoma when disintegration of the surface has taken place, but is more usually absent in spindle-celled sarcoma, except at quite a late stage. Severe spasmodic or lancinating pain is an early symptom in many cases, but in others it is absent throughout or up to a late period, though usually present when surrounding organs are becoming infiltrated. In the latter stages cancerous cachexia becomes marked. The cancer may extend to the cervix, to all neighboring organs, and by metastasis to different parts. It is liable also to break down into cavities, which may penetrate the uterine wall, so that cystlike spaces are formed, with gangrenous or semi-purulent contents. These may at first be limited by pseudo-membranes, but are apt to lead to perforation into the peritoneal cavity, and fatal peritonitis. Otherwise death may be brought on gradually by hæmorrhage and exhaustion.

Diagnosis.—The disease in its early stage is very apt to be mistaken for a fibroid tumor, especially for a fibroid tumor complicated by fixation due to periuterine inflamma-

tion. The differentiation may sometimes be made by the fact that in cancer there is generally a frequent recurrence of hæmorrhage during the intervals of menstruation, or a persistent blood-tinged discharge. Profuse hæmorrhage is also likely to be produced by the use of the sound. If a soft fungoid mass, not being the product of conception, is felt within the uterus during the period of active sexual life, the probable diagnosis is that of round-celled sarcoma. The only certain mode of distinction, however, in the earlier stages of cancer, is to remove a portion of tissue for microscopic examination. The simplest mode is to bring away a small fragment by the blunt wire curette (see p. 190), or in the eye of a silver catheter which has been introduced and turned round once or twice. If this fails, the cervix may be dilated, and a fragment removed by the finger, or by the blunt or sharp curette.

Treatment.—If the disease can be positively diagnosed while the uterus is perfectly movable, and there is no trace of any extension to neighboring organs, it may be justifiable to extirpate the whole uterus by Freund's method (see p. 232); but this operation is yet on its trial. In general the treatment can only be palliative, especially for relief of pain. Severe hæmorrhage may be checked by occasional applications of nitric acid, or by scraping away the proliferating surface by Simon's spoons, or the sharp curette, the cervix being first dilated if necessary. Any polypoid masses of sarcoma or carcinoma should be removed by the écraseur.

TUBERCULOSIS OF THE UTERUS.

Tuberculosis of the uterus is rare, and is almost always associated with the same disease in other organs. Tubercle is deposited in the mucous membrane, and is transformed into a cheesy material, which breaks down and leads to ulceration. The whole interior of the body of the uterus

may thus be converted into a ragged cavity, the disease generally not extending to the cervix. The Fallopian tubes are commonly affected in the same way, and tuberculosis of the peritoneum and ovaries is also frequently associated.

The affection often escapes notice in the more important disease of other organs. The local *symptoms* are purulent discharge, with occasionally hæmorrhage, but as a rule, amenorrhœa rather than menorrhagia. The uterus is found uniformly enlarged, and may also be fixed. The *diagnosis* is assisted by evidence of tuberculosis elsewhere, especially tubercular peritonitis. The *treatment* can only be palliative.

CHAPTER VIII.

DISEASES OF THE OVARIES.

MALFORMATIONS OF THE OVARIES.

THE ovaries may be congenitally absent, but this defect is almost always associated with absence of the uterus, and generally with want of development of the vagina, vulva, and breasts. More frequently, while the uterus is absent, the ovaries are developed. In the absence of the ovaries, a childish condition is generally perpetuated in the whole body, and the stature remains small, but in some cases there may be an approximation towards the male type. Sexual feeling is always absent.

Imperfect development of the ovaries is of much greater frequency. It may be associated with a rudimentary condition of the uterus, or, more frequently, with a small anteflexed uterus, and small vagina, while occasionally the uterus is well formed. Menstruation and the general changes associated with puberty are either deferred, or entirely fail to appear. Menstruation, when it does commence, is scanty and irregular, and is liable from slight causes to be arrested for a long period or permanently, while the menopause generally occurs early. General development either does not proceed much beyond the childish stage, or the body is muscular, with a tendency to production of hair on the chin and legs, and frequently a harsh voice. The pelvis is often uniformly small, or of a childish or masculine type. There is also usually an absence or deficiency of sexual feeling, which may lead to unhappiness in married life.

Complete absence of the ovaries is difficult to distinguish

from imperfect development, but may be diagnosed with probability, if, in a not very stout woman, no trace of the ovaries can be felt on bimanual examination with the aid of an anæsthetic, if sexual feeling is entirely absent, and if, after a fair trial, all treatment fails to induce menstruation. All further treatment should then be abandoned.

Treatment.—In cases of imperfect development the general treatment should be of a tonic kind, with nutritious food, and especially the administration of iron in full doses. Local stimulus to the ovaries by faradization may be tried. One pole of the battery may be placed over each ovary successively, and the other over the sacrum, or, if this fails, the second pole may be applied to the cervix, or even to the interior of the uterus, by means of a rheophore shaped like a sound. In the last case the current should at first be gentle, and used only for a few minutes. The most powerful mode of causing a fluxion to the ovary, however, is a stimulus applied to the uterus by means of an intrauterine stem, and especially the galvanic stem. For the mode of use and precautions necessary, see p. 106, and also the section on Amenorrhœa. Marriage has a beneficial effect, and sometimes, after the signs of rudimentary development of ovaries have existed for years, pregnancy takes place, and menstruation is afterwards more natural.

ATROPHY OF THE OVARIES.

The physiological atrophy of the ovaries, which usually happens about the menopause, may occur prematurely, and lead to cessation of menstruation. This may be the result of acute ovaritis, or of pelvic peritonitis or cellulitis, more especially of peritonitis, from the effect of which the ovaries may be bound down in an abnormal position, and the natural liberation of the ovules prevented. Sometimes, also, it occurs without any local affection as the sequence of a serious illness, or from the effect produced upon the

nervous system by a deep sorrow or other strong emotion.
This is more likely to occur if the ovaries are from the first
somewhat imperfect in development.

Treatment.—A cautious attempt may be made to stimu-
late the ovaries in the same manner as in the case of primary
imperfect development, but should not be too long perse-
vered in if it does not lead to any effect. If periuterine
inflammation has existed, intrauterine stems should be
avoided.

PROLAPSE OF THE OVARIES.

In a normal condition, the ovary rests as far forward as
its attachments will allow it, although posterior to the plane
of the broad ligament, being kept in position by the pressure
of the intestines, which fill the fossa behind it. Its most
notable displacement is one in which it drops below its nor-
mal level, and too far backward, descending into Douglas's
pouch, and at the same time, owing to its attachment to
the angle of the uterus by the ovarian ligament, is neces-
sarily brought nearer to the middle line. The causes of
this displacement are (1) increased weight of the ovary due
to hyperæmia, hyperplasia, or commencing degeneration of
a cystic or any other kind ; and (2) retroversion, retroflex-
ion, or prolapse of the uterus. By these displacements of
the uterus the ovaries are necessarily carried backward and
downward, and the coils of intestine which normally keep
them in position are displaced.

Results and Symptoms—Ovaries in this position are
almost invariably affected by chronic hyperæmia or ovaritis,
and not unfrequently they become fixed by inflammation of
their peritoneal covering. The displacement, by rendering
the ovary more exposed to pressure or traumatic influences,
tends to promote or maintain the inflammation. Thus the
symptoms of ovarian hyperæmia or inflammation are pres-

ent, often in an acute degree, those specially intensified by
the displacement being pain in defecation and pain in
coitus.

Diagnosis.—When thus prolapsed the ovaries can be
reached more or less easily by the finger in vagina or rec-
tum. When the prolapse is slight the examination must
be made in the lateral position, and the finger, with its flexor
surface towards the sacrum, must be carried as high as pos-
sible posterior to, and a little to one or the other side of the
cervix. The ovaries are recognized by their size and their
shape, somewhat globular, but having often nodular irreg-
ularities. They are generally also more or less movable, and
have a peculiar tenderness, analogous to that of the testicle.
Often sickening pain, and not unfrequently hysterical mani-
festations, are produced when they are pressed. In carrying
the fundus uteri forward with the sound the displaced ovary
is elevated to some extent. If both ovaries are prolapsed
the double tumor makes the diagnosis more obvious.

Treatment.—When any degree of retroversion or retro-
flexion of the uterus is present it is important to remedy
that displacement if possible, but the presence of the tender
ovary frequently renders it difficult to adapt any pessary
which can be tolerated, even after hyperæmia has been
treated by rest and local depletion. In many cases, how-
ever, a Hodge's pessary may be found by trial, which will
restore the uterus and elevate the ovary in some measure,
its posterior limb sometimes resting between ovary and uterus.
A thick instrument should be chosen, or one having a broad
cylindrical expansion at its posterior part, like that of Dr.
Thomas (Fig. 27). The general treatment should be that of
ovarian hyperæmia and inflammation (see p. 251), special
care being taken to render the fæces soft.

HERNIA OF THE OVARY.

The ovary may descend into a hernial sac, generally of the inguinal kind. There is a congenital, but very rare, form in which one, or usually both ovaries descend by a fault of development into the labium majus, or into a pouch of peritoneum which remains open in the inguinal canal, just as the testis descends into the scrotum in the male sex. The ovary is then generally irreducible, and other malformations of the genital organs often exist also.   Acquired hernia of the ovary is generally associated with hernia of intestine or omentum, and is more likely to occur soon after delivery, when the attachments of the ovary are loose. The ovary is apt to become inflamed and degenerated in its abnormal position. In the case of an apparent hermaphrodite, a body of doubtful nature is more likely to be a testicle than an ovary.

Treatment.—An acquired hernia may be reduced, if possible, and its return prevented by a truss. In congenital or irreducible hernia, the ovary should be protected by a concave shield. If the ovary become inflamed, and cause very severe distress, it may be excised, an operation which has been found necessary in several recorded cases. The operation should be performed with antiseptic precautions.

ACUTE OVARITIS.

Acute ovaritis (or oophoritis, as it has been called with greater philological propriety) is a rare affection. In its most severe form, leading to the formation of abscess, it is generally the result of septic absorption after delivery or abortion, and forms part of an acute inflammation of the broad ligaments and adjacent peritoneum. It may also, apart from parturition, be associated with pelvic peritonitis or cellulitis, especially, but not exclusively, with that of

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septic origin. An abscess originating in ovaritis may in very rare cases run a chronic course and present signs similar to those of a small cystic tumor. It is much more common, however, for suppuration to occur secondarily to cystic disease. An abscess of the ovary may burst into the peritoneal cavity and lead to fatal general peritonitis.

A somewhat less acute ovaritis, not usually ending in abscess, may result from the extension of acute endometritis, especially that of gonorrhœal origin. The infection appears to extend directly to the ovary, when it is embraced by the Fallopian tube at a menstrual period. The ovaritis may also arise through the medium of pelvic peritonitis, which is itself a common result of gonorrhœal inflammation. Cases of acute ovaritis have been traced to exposure to gonorrhœal infection, even when there has never been any manifestation of acute vaginal inflammation. Acute ovaritis, not usually leading to suppuration, may also occur in the course of specific fevers, such as small-pox. As the result of acute ovaritis the tissue may be so disorganized that ovulation ceases, and permanent amenorrhœa is the result. The subacute forms are apt to leave a chronic ovaritis behind, and sterility is a common consequence of the peritoneal adhesions which remain around the ovary.

Diagnosis.—The symptoms of acute ovaritis are often merged in those of the septicæmia, peritonitis, or cellulitis, with which it is associated. In cases, however, in which the ovaritis is the prominent feature, a diagnosis may be made from the localization of pain and tenderness, and from the recognition, on bimanual examination, of a rounded swelling, not usually movable, in the position of the ovary.

Treatment.—In the septicæmic form no special treatment can be directed to the ovary. In simple inflammation, when acute ovaritis forms the chief part of the affection, perfect rest should be enjoined, and leeches may be applied to the groin, round the anus, or to the cervix uteri.

Poultices or fomentations should also be applied, and opiates may be given with iodide of potassium. If an abscess is recognized special care should be taken to avoid any movement which might lead to rupture into the peritoneal cavity. If fluctuation can be felt from the vagina the pus should be evacuated by the aspirator.

HYPERÆMIA OF THE OVARY AND CHRONIC OVARITIS.

Causation.—Since the ovaries, like the uterus, are naturally subject to a periodical active hyperæmia, this hyperæmia is easily rendered excessive by various causes, and may pass into actual inflammation. It is still more difficult than in the case of the uterus to draw any positive line between hyperæmia and inflammation, the ovaries being less accessible to observation. The tendency to ovarian hyperæmia is often a constitutional peculiarity of the individual, and is probably associated with excessive development of the organ. It is generally found in women of an emotional and hyperæsthetic temperament, with frequently a predisposition to hysteria. Such women begin to menstruate early in life, and their menstruation is habitually profuse, until after marriage and parturition, by which it is often rendered more normal. Unless brought on prematurely by some cause of uterine or ovarian degeneration, the menopause generally occurs late.

The most important causes of reflex ovarian hyperæmia are morbid conditions of the uterus, which is more liable than the ovary to displacement, and more exposed to traumatic influences. Ovarian hyperæmia may also be produced by sexual excitement or excess. Masturbation is undoubtedly one of the causes of hyperæmia, both of uterus and ovaries, but is much less than in the other sex. A similar effect may result from imperfect coitus, often dependent upon premature emission on the part of the husband.

Celibacy must be reckoned among the causes of ovarian hyperæmia, since after marriage menorrhagia, congestive dysmenorrhœa, and other signs of ovarian irritability are often relieved, even if pregnancy does not occur. But on the other hand chronic endometritis or metritis with sterility is often associated with ovarian hyperæmia or ovaritis, due in part to the want of that physiological rest to the ovary which is afforded by pregnancy.

Passive Hyperæmia of the ovary is produced by general causes similar to those which lead to the same condition in the uterus, especially by constipation. When the ovary has once become prolapsed its venous circulation is further interfered with, and it becomes more exposed to direct causes of irritation. Passive hyperæmia renders the organ more vulnerable to causes of inflammation, and tends to produce hyperplasia and enlargement. From induration of the superficial tissue the normal rupture of follicles may be interfered with, and inflammation thus secondarily set up, or the foundation of cystic degeneration laid. The importance of passive hyperæmia as a predisposing cause of chronic ovaritis is shown by the preponderance of that affection on the left side. This, like the usual occurrence of varicocele on the left side in the male sex, must depend upon the presence of the rectum and sigmoid flexure on the left side, whereby pressure upon the veins is liable to be produced, and upon the more indirect course of the left ovarian vein, opening into the renal vein, instead of directly into the vena cava.

Inflammation of the ovary may result simply from an intensification of the reflex irritation which leads to active hyperæmia, or it may be produced indirectly by the hyperæmia leading to an excess in the normal slight effusion of blood on the rupture of a follicle. The results of this may be irritation and inflammation, either directly in the ovary, or primarily in the adjacent peritoneum and secondarily in the ovary. Chronic ovaritis is also frequently the sequel of

acute or subacute ovaritis, especially that of gonorrhœal origin. It is a common result again of pelvic peritonitis, either by direct extension of inflammation, or from the obstacle to normal ovulation which thus arises, and the interference with the venous circulation. Inflammation may also be set up by irritation due to the presence of follicles in a state of commencing cystic degeneration.

Pathological Anatomy.—That organic change in functionally active ovaries, passing beyond the stage of mere hyperæmia, is very common, is shown by the frequency with which, after death, signs are found of a very limited, local peritonitis, apparently having had its origin in those organs. The ovaries themselves also are often enlarged and nodular from irregular hyperplasia, and in such cases frequently contain small cysts containing limpid fluid, and formed by enlargement of the Graafian follicles, probably often the consequence of a previous fibroid degeneration of the stroma. When the ovaries have been removed by spaying, on account of extreme nervous symptoms, dependent upon ovarian irritation, they have generally been found degenerated, and enveloped in adhesions, even though no pelvic peritonitis had ever been diagnosed. Distinctions have been made between follicular and interstitial ovaritis, but they cannot practically be clinically separated, although inflammation of the follicles is doubtless generally the primary change, except in the acute septic forms of the disease.

Results and Symptoms.—Pain in one groin does not necessarily indicate ovaritis, but is a common result of uterine disease. But in ovarian hyperæmia or inflammation pain in the groin and extending down the thigh is a marked symptom, while there is also tenderness in the ovarian region, and the muscles on the affected side are rigidly contracted to protect the tender spot. Menorrhagia is a usual symptom, except in the later stage, when the ovary is

atrophied, or when it has been severely damaged by acute inflammation. In other cases, however, the uterus may be imperfectly developed, and then menstruation may be scanty, while the insufficiency of the flow is in part the cause of the ovarian hyperæmia. A more extreme hyperæmia has sometimes been observed in cases of entire absence of the uterus. The pain in the ovarian region is usually aggravated in connection with menstruation, and the aggravation generally commences a few days or a week before the period. It is often relieved by the flow, provided that no cause of obstructive dysmenorrhœa coexists. Pain may be produced by coitus, especially if the ovary is prolapsed, and in that case defecation also is apt to be specially painful.

The reflex nervous symptoms enumerated under the head of Corporeal Endometritis and Metritis (see p. 187) are still more marked in the case of decided ovarian hyperæmia or chronic ovaritis. The chief effects produced are nausea, vomiting, flatulence, or other gastric neuroses, pain under the left breast or at the top of the head, and above all, hysteria. Hysteria, while largely dependent on constitutional proclivity, is commonly due in the first instance, to some actual source of pain, which, in predisposed subjects, leads to such a state of irritability that after a time the slightest stimulus of a physical or mental kind is sufficient to evoke hysterical manifestations. The prime source of irritation is not necessarily in the sexual system, since hysteria may sometimes be induced before the age of puberty, or after the menopause, from the effect of a wound or injury. But in the hysteria of young adults, some source of irritation in uterus or ovaries appears to be the commonest cause. In the extreme forms of hystero-epilepsy with hallucinations, recorded by Professor Charcot, the connection with the ovary appears to be a constant one. It is probable also that, when uterine disturbance is the prime factor, reflex

ovarian irritation is often an intermediate step in causation. Thus in the not uncommon case of retroflexion and engorgement of the uterus, with prolapse of the ovaries, in a hysterical subject, nervous manifestations are usually more easily produced by pressure upon an ovary than by that upon the uterus. Hysteria is not necessarily the result of sexual excitement or sexual abstinence, for it may occur for the first time in a married woman as a sequel to uterine displacement, resulting from parturition, or to peri-uterine inflammation. But in the strong emotional susceptibility of hysterical subjects, the sexual emotion usually takes part; and this is often the case in a special degree when ovarian hyperæmia is the starting-point of irritation.

Diagnosis.—Pain and even tenderness on external pressure in the ovarian region is not sufficient ground for positive diagnosis. If a vaginal exploration be made very gently and carefully, it will be found that, although a general hyperæsthesia often exists, a special and extreme tenderness is manifested when pressure is made upon the ovary. If the ovary is more or less prolapsed, so as to be reached by the finger in the vagina somewhat behind the cervix, this tenderness is easily recognized, and the ovary is often felt to be enlarged and nodular. If not the ovary may often, on bimanual examination, be caught between the two hands in its normal position, and made out to be enlarged and tender, but generally movable. Sometimes the rigidity of muscles prevents this, and unless an anæsthetic be given, nothing more than increased resistance and excessive tenderness localized in the ovarian region can be detected. Frequently rectal exploration allows the finger to reach the ovary more fully than is possible by vaginal touch.

Treatment.—All postural causes of passive hyperæmia, such as prolonged standing or sitting, should be avoided. Long-continued practicing on the piano, and, still more, playing on the harmonium, or the use of the treadle sewing

machine are especially injurious. Any sources of undue
emotion should be removed as far as possible and rest prac-
ticed in moderation. It is of importance to relieve the
portal system and render the fæces soft by saline laxatives,
and it is often of advantage to secure an action of the bowels
in the evening, that there may be no source of venous con-
gestion during the night. In the case of married women,
strict moderation in coitus should be enjoined, but in ovarian
hyperæmia temperate use of the sexual function is generally
more salutary than total abstinence, provided that no suffi-
ciently acute inflammation is present to cause distress in inter-
course. If local pain and tenderness are severe, they may be
relieved by depletion of the cervix uteri, and, in this case,
leeching is more effective than puncture. The effect, how-
ever, is not so direct as in the case of hyperæmia of the
uterus; and the depletion should not be too often repeated,
lest it have deteriorating effect upon the general health.
Counter-irritation is generally preferable to depletion, and
may be carried out by the application of blistering fluid to
the groin over the tender regions, repeated at intervals.
In milder cases the linimentum iodi may be painted re-
peatedly over the same spot of skin, as long as it can be
tolerated. Dr. Barnes recommends, as a still more effica-
cious counter-irritant, the application of caustic, such as the
potassa cum calce, to the cervix uteri (see p. 144). Counter-
irritants often tend also to relieve reflex nervous symptoms,
such as vomiting, the second impression having apparently
an inhibitory effect upon the primary irritation. To relieve
reflex vomiting it is often best to apply the counter-irritant
over the epigastrium.

Of internal remedies, the most valuable for curative effect
are the iodide and bromide of potassium. The former when
long continued in sufficient doses, tends to cause atrophy
and absorption of ovarian, as of other glandular tissues.
Bromide of potassium relieves active hyperæmia of the pel-

vie organs in general, and acts also as a sexual sedative. It is also better tolerated for a long period than iodide of potassium. When gastric and intestinal neuroses are present these drugs may be combined with bitter stomachics and laxatives.* Small doses of perchloride of mercury, administered for a long period, may also be tried as an absorbent.

In the more chronic stage, a general tonic treatment is desirable, especially for the cure of the nervous or hysterical symptoms, which often persist after the prime irritant cause has, in great measure, been removed. Cold baths are specially efficacious, and, when aided by the change of scene afforded by a course of treatment in a hydropathic establishment, have often an additional effect. Sometimes seabathing, or the addition of salt to the baths, proves still more beneficial. Cinchona or quinine may be combined with bromide or iodide of potassium. Iron must be avoided if any considerable menorrhagia or active hyperæmia is present, but for the cure of nervous symptoms it is of great value, and it is specially useful if menstruation is scanty. It is often better borne if combined with bromide of potassium, and a laxative should be added if necessary. Alcohol should be used sparingly, and all sedatives, and especially opiates, should be reserved as much as possible for paroxysmal attacks, when they may be used in the manner described under the head of Congestive Dysmenorrhœa. Great relief, at such times, is afforded by warm hip-baths, and still more efficacious is the whole-bath, in which the patient should remain for a considerable period. Poultices or fomentations may also be used when pain is acute.

In a few cases of extreme nervous disturbance arising from ovarian irritation, especially those in which reason ap-

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* The following is a useful formula: R. Magnesiæ Sulphat. gr. xxx; Potass. Bromid. gr. xx; Tinct. Gentianæ co. ʒj; Aq. ad ℥j ter die.

peared to be threatened, the operation of spaying, or removal of the functionally active ovaries, either by vaginal or abdominal section, has been performed by Dr. Battey and others. Dr. Battey chooses vaginal section by preference, but the other method gives a greater probability that the whole ovary can be removed, even if adherent, and allows of more perfect antiseptic precautions, although apart from the antiseptic method, it has proved more dangerous than vaginal section. Experience has shown that the operation is likely to fail in curing unless both ovaries are removed. The proportions of deaths after the operation has been so considerable that at present it does not seem justifiable to undertake it for the cure of a disorder not threatening life or reason, but this conclusion may be modified by further experience.

CYSTOMATA, OR CYSTIC TUMORS OF THE OVARY.

Causation.—Cystic tumors are the most frequent and important of new growths in the ovaries. The origin of cysts in this situation, as in other places, has been attributed by some to the formation of a space in the interstices of the stroma, or to the enlargement of a single cell. The special frequency, however, of cysts in an organ which normally contains physiological cysts, namely, the Graafian follicles, and the rarity of the commencement of ovarian cysts, except during the years of active sexual life, are sufficient to indicate that, in the great majority of cases at any rate, the cysts originate from abnormal growth of the Graafian follicles, and are therefore a form of adenoma. In multilocular tumors the ovum or its remnant has actually been detected by Dr. Ritchie and others in many of the smaller cysts, whose size does not exceed that of a cherry, and whose contents are a limpid fluid, and thus the mode of origin of the cysts is demonstrated as regards these instances. In the

larger cysts, and those having colloid contents, the ovum can never be detected. It is probable that, in the case of cysts containing colloid fluid, the disease does not originate from full-grown or far-advanced Graafian follicles, but commences, while they are in a very rudimentary condition, by an altered growth of the follicular walls and their epithelial lining. Small colloid cysts may be found in the ovary even at birth, but appear usually not to undergo enlargement before the age of puberty. Nothing certain is known as to the cause of commencement of cystic growth, but it is probable that in some cases it is due to fibrous hyperplasia of the ovary—usually the result of previous hyperæmia or ovaritis—preventing the maturation or rupture of the follicles, or to their becoming developed too far from the surface to allow their reaching it. It is possible that the premature death of the ovum, by preventing maturation of a follicle, may lead to cystic degeneration. In the normal condition, however, many follicles become atrophied without ever having ripened, and this cannot therefore be the sole condition present. It is possible, again, that the failure of the follicle to rupture may be the result of an insufficient menstrual hyperæmia in the ovary, such as occurs in chlorosis and other forms of anæmia.

Pathological Anatomy.—An important practical distinction is to be made between tumors consisting mainly of one, or of a very few, large cysts, and those made up of a large number of small ones. It is very rare, however, for a true ovarian cyst to be actually unilocular, and the two classes are rather to be termed paucilocular and multilocular cysts. At an early stage of degeneration the cysts are almost invariably multiple, and the large cyst generally arises by the breaking down of the partitions between a number of smaller ones. Thus a large number both of paucilocular and multilocular tumors are merely aggregations of simple cysts.

From these are to be distinguished the *proliferous cysts*, in which there is a further departure from the normal conditions of growth, and an approximation towards malignancy. In these tumors secondary cysts are formed all over the walls of the primary cysts, instead of being merely developed out of the primary ovigenous layer. The growth is at first of a glandular character. The epithelial lining dips into the cyst-wall in the form of crypts, and these become closed cavities, which are afterwards distended by secretion. Some describe the glandular formations as commencing in the form of a closed cavity, beneath the superficial epithelium. In another variety of proliferous cyst the proliferation takes the form of a growth of papillary processes from the cyst-wall. These are covered at first with cylindrical epithelium, which becomes irregular and multiform in its proliferation, and is often heaped up in projecting masses, like bunches of grapes, which are easily detached. This form of proliferation is a step towards the formation of cancer, for the epithelium between the papillæ tends at the same time to invade the subjacent tissue and may so give rise to a true carcinoma. On rupture of the cyst, either from excessive papillary growth or any other cause, the exuberant epithelium becoming detached conveys cancerous infection to the peritoneum. This form of growth has been called *cystoma proliferum papillare*.

The cyst-walls of an ovarian cystoma are covered on their peritoneal surface with an epithelium like that of the peritoneum, and internally generally by cylindrical epithelium. The structure of their substance is of the connective-tissue type, and varies from a fibrous or areolar tissue with few nuclei, such as is found in the walls of large and slowly growing cysts, to a more vascular and imperfectly formed tissue, which must be regarded as sarcoma, generally of the spindle-celled variety. By rapid growth of this tissue the thickness of the cyst-walls may become

great in proportion to the dimension of the cysts; and, when the proportion of this solid matter is considerable, the tumor becomes a *cysto-sarcoma*. In proportion to the relative amount of solid material is the tendency toward malignancy in the tumor, and this is more manifest if the tissue has anywhere the character of round-celled sarcoma. Such form of growth frequently affects both ovaries together, and it tends to invade other tissues, when adhesions have occurred, and to recur in the pedicle, or by metastatic deposits after removal. That, in comparison with other sarcomata, it does not earlier show a malignant character, and that it may be eradicated if removed early enough, probably depends upon the isolated position of an ovarian tumor while free from adhesion.

The contents of the cysts vary from a gelatinous or colloid substance which will not flow through a canula to a clear and limpid fluid. In most cases the fluid is somewhat viscid, and its color is often brownish or greenish. In the multilocular, and especially in the proliferous cysts, the fluid is usually more gelatinous. Frequently it varies greatly in the different cysts of the same tumor. The more viscid fluids contain albumen and its derivatives, also albumen, paralbumen, metalbumen, and peptone. The so-called *colloid* tumors are made up of a number of very small cysts, containing colloid fluid. A clear limpid fluid, of specific gravity below 1010, containing only a trace of albumen, may be found in a true ovarian cyst, and even, in rare cases, in the several cysts of a multilocular tumor. If, however, a cyst containing such fluid is unilocular, it is more likely to be of parovarian origin (see p. 258).

In some cases the fluid of an ovarian cyst has escaped through the uterus, and such a discharge may happen on repeated occasions. This is generally brought about by rupture of a cyst into the dilated Fallopian tube, whereby a *tubo-ovarian* cyst is formed. A pseudo-cyst may also be

produced by adhesion of the pavilion of the tube to the ovary, and distension of the cavity by serum or pus. A few cases have been recorded in which simple cysts containing limpid fluid have been found attached to the peritoneum without connection with the ovary, and these have been ascribed to cystic growth of an unimpregnated ovum which had become attached to the peritoneum like the ovum in abdominal fœtation.

Ovarian tumors generally become pedunculated as they enlarge. The pedicle, which may be long and slender, or short and broad, contains a portion of the broad ligament stretched out, the ligament of the ovary, the ovarian vessels, and the Fallopian tube, which is generally much enlarged, and extended, more or less, over the surface of the tumor. In some cases, however, a cyst, having all the characters of an ovarian cyst, occupies the same position as the so-called "cysts of the broad ligament," having no pedicle, but descending deeply between the folds of the broad ligament. This condition may arise from a follicle having made its way, not to the surface of the ovary, but through the mesovarium into the broad ligament.

Parovarian Cysts, which form the most important variety of what have been called cysts of the broad ligament, are formed by distension of one of the tubules of the parovarium, or organ of Rosenmüller, a small body which is the relic of the ducts of the Wolffian body, and is situated in the thickness of the broad ligament, between the outer extremity of the ovary and the Fallopian tube. Their growth is slow, and they often do not increase beyond a small or moderate size, but sometimes they grow large enough to distend the whole abdomen. They are generally found in young women. The contained fluid is limpid, like water, of low specific gravity, generally below 1005, and contains only a trace of albumen, which is usually precipitated only by nitric acid, and not by heat alone. The cysts are almost always uni-

locular, but rarely may be made up of several, having thin septa, more than one tubule having become dilated. The cysts, in some cases, become pedunculated, but are more likely than true ovarian tumors to descend deeply between the layers of the broad ligament. The ovary is often found distinct, with its mesovarium intact. The Fallopian tube is usually more extended over the cyst than in the case of a true ovarian cyst, and may reach over three-fourths of its semi-circumference. The cyst-wall contains involuntary muscular fibres, which are not usually found in the wall of true ovarian cysts; it is generally separable into two layers, and is often lined by ciliated epithelium. Parovarian cysts are not unfrequently cured by a single tapping.

Results and Symptoms.—Ovarian cysts, as they grow large, are liable to become adherent to surrounding parts, especially to the omentum and abdominal walls, but sometimes also to the pelvis, intestines, and even the liver and stomach. The more solid tumors generally acquire adhesions more readily than those consisting mainly of a few large cysts. Nutrition of ovarian cystomata is apt to fail, especially in the case of multilocular tumors, and the cysts then undergo a partial necrosis, but without putrefaction, so long as air is excluded. The walls of the cysts may become softened, and the fluid within them may contain shreds of broken-down tissue. More complete death of the tumor results if the pedicle becomes twisted, so as to compress the vessels contained in it. Even after this accident, however, more or less vitality may be maintained through the medium of vascular adhesions.

Inflammation in the tumor may be set up by necrotic changes, or other causes, and then the cysts may suppurate, or lymph be effused within them. As the effect of inflammatory or necrotic changes, general peritonitis is apt to be set up, and the surface of the tumor may then become completely adherent to all the surrounding parts. Without the

occurrence of any acute peritonitis, more or less ascitic fluid is often poured out by the peritoneum in consequence of the irritation caused by the presence of the tumor, and occasionally this fluid is copious though the growth is only of small size. In some cases, the walls of a thin cyst give way from distension, or from the effect of some strain or violence. If the contained fluid is bland, it is absorbed by the peritoneum, and in this way a spontaneous cure sometimes results, while, in other cases, the fluid again collects after a time. If the fluid has undergone inflammatory or necrotic change severe peritonitis is set up, and often proves quickly fatal. In rare cases, after inflammation and suppuration of a cyst, it may discharge either into the intestine (generally the rectum) or externally. After admission of air, as by tapping, or in consequence of communication with the intestine, septic inflammation of a cyst may be set up, and it may then become distended by fetid gas. Hæmorrhage may take place into ovarian cysts either after strangulation of the vessels by twisting of the pedicle, or spontaneously from papillary growths. Death may then result from loss of blood or shock, or inflammation may be set up in the cyst, or in the peritoneum after rupture of the cyst. In rare cases death occurs from intestinal obstruction, ileus being produced either by the effect of adhesions, or from the intestines having simply become twisted in consequence of the pressure. Cure of an ovarian cyst, of any considerable size, by absorption is doubtful, though tumors diagnosed as ovarian cysts sometimes disappear. But, in those cases, rupture or perforation may have occurred, or the tumor may have been a pseudo-cyst (see p. 267).

In the earlier stages of an ovarian tumor, menstruation is often irregular and painful, and sometimes excessive. In the later stages it is often diminished, and amenorrhœa is common if both ovaries are affected. The general symptoms are often slightly marked, and frequently nothing is noticed

except the increase of size. While the cyst is small and remains in the pelvis, trouble in defecation and micturition may be produced by pressure. These are relieved when it rises into the abdomen, but progressively increase if it happen to become fixed by adhesions while still small. In other cases more or less pain is felt in the tumor, and attacks of pain may also indicate the occurrence of local peritonitis set up by its presence, though such a local peritonitis often runs a very latent course.

As the tumor becomes very large, its pressure interferes seriously with vital organs, especially the heart and lungs. There is general wasting, and the face acquires a peculiar expression of combined emaciation and anxiety. The urine becomes scanty from pressure on the renal vessels, and sometimes albuminuria may be produced, although usually not till a very late stage. In some cases, especially when extensive pelvic adhesions exist, there is pressure upon the ureters, and consequent damage to the kidneys. Swelling of the legs is frequently produced by pressure, and the œdema may extend to the abdominal walls and back.

When inflammation or necrotic change has occurred in the tumor, hectic fever of an irritative kind is set up. The occurrence of such fever, in the absence of sufficient pain and tenderness to indicate acute general peritonitis, is an evidence of changes in the tumor, and an indication for early removal, if practicable. When pregnancy occurs in conjunction with an ovarian tumor, considerable increase of danger arises, if the tumor is large, from the excessive distension, and also from the risk of strangulation by twisting of the pedicle. If the tumor is small it is apt to occupy the pelvis, and impede delivery.

All varieties of ovarian tumors may grow to an enormous size. In the majority of cases of considerable tumors, not subjected to curative surgical treatment, death occurs within three years, although small or moderate tu-

mors may remain quiescent for a long period. Exceptionally even in the case of large tumors the course may be protracted for many years, and in some instances the operation of tapping has been repeated very many times.

Diagnosis.—When the presence of an abdominal tumor is suspected, the patient should be placed on her back on a hard couch, the head on a low pillow, the skin of the abdomen uncovered, and the knees drawn up so as to relax the abdominal muscles. The examination should be made first by abdominal palpation and percussion, afterwards by bimanual exploration.

Phantom Tumors, due to flatulent distension of intestines, deposit of fat in the abdominal walls, or muscular contraction, are generally easily distinguished by the resonance of the abdomen, and by no tumor being felt between the hands on bimanual examination. Whether or not any other tumor is discovered, special care should be taken to discover the presence or absence of *pregnancy*, by looking out for all the signs of that condition, particular regard being paid to the consistency of the cervix.

When an ovarian tumor is large, and is of the multilocular variety, but contains one or more large cysts, diagnosis is generally easy. The outline of the tumor is more or less irregular, both to the eye and the touch, and the irregular prominences are often found to move downward on deep inspiration. There is dulness over the whole tumor, and resonance in the flanks, while the margins of the tumor can often be felt by pressing the hand flat upon the surface. If one hand be laid upon the abdomen, and a gentle flip be given by a finger of the other hand, a fluid thrill can be felt over some part of the tumor, but not throughout its whole extent, while over the area not reached by the thrill, more resistant portions, or solid masses, can often be felt. This vibratile thrill is conclusive of the

presence of fluid, while mere fluctuation may sometimes be transmitted by an elastic semi-solid tumor.

When a large tumor consists mainly of one large cyst, so that a uniform fluid thrill is felt over the whole of it, and no firmer portion can be detected, the essential point is to distinguish it from *ascites*, and the differentiation is sometimes a difficult one. In most cases the diagnosis may be made from the shape of the abdomen and the results of percussion. In ascites the abdomen spreads out more laterally, while in ovarian cysts it is more prominent in front and tends to overhang the symphysis pubis. In ascites there is dulness in the flanks in the dorsal position, and resonance in front, while the areas of dulness and resonance alter according to position, so that, in the lateral or upright position the portions of the abdomen uppermost at the time become resonant, and the dependent parts dull. In a large ovarian cyst there is dulness over the whole centre of the abdomen, and resonance only very far back in the flanks, coming further forward on the side opposite to that on which the tumor originated. When an ovarian cyst, after entry of air, contains gas as well as fluid, there will be resonance in front, but this condition is easily distinguished by the succussion splash produced on shaking the patient.

Exceptions to the usual rule occur in the case of ascites when the intestines are bound down by adhesions, or the mesentery shortened, so that they cannot reach the surface, and also when the abdominal distension is very extreme, in which case also the abdomen becomes more prominent in front, so that its shape resembles that usual in the case of ovarian tumor. More or less resonance may also be produced by the large intestines fixed in either flank, and then the signs correspond almost exactly to those usual in the case of an ovarian cyst. In order to solve the difficulty an attempt should be made to detect the upper margin of a tumor, by laying the hand flat upon the surface at about the

upper limit of dulness, and pressing it in during expiration. Trial should also be made, whether on deep inspiration any inequality can be seen or felt moving downward beneath the abdominal wall, or any friction-sound heard. When the fluid is within an ovarian cyst, it is generally possible to reach from the vagina the lower segment of the cyst, most frequently in front of the cervix, and feel an impulse transmitted from above. In ovarian dropsy, the uterus is generally drawn somewhat upward, and its mobility often somewhat impaired, while in ascites it is low down and movable. In ascites the fluid thrill extends further round toward the back, over the area in the flanks where partial resonance may exist, while in ovarian dropsy it is limited at the same line as the dulness, unless ascitic fluid is present in addition to the cyst. In some cases the only certain test is a preliminary tapping. By this the character of the fluid is ascertained, and frequently after its removal the presence of secondary cysts or solid matter is revealed. If desired, a small quantity of fluid may be drawn off by the hypodermic syringe for examination, but the preliminary tapping is generally desirable in the case of a possibly unilocular cyst of slow growth, and occurring in a young woman, since such a tumor may be cured by tapping alone.

The difficulty of diagnosis between ascites and ovarian dropsy is especially likely to arise in the case of cancer of the peritoneum, in which the intestines are apt to be held back by shortening of the mesentery, and solid masses may be felt in the abdomen, somewhat resembling the firmer portions of an ovarian tumor, but usually more movable in the fluid, and felt only by dipping for them. In peritoneal cancer hard masses are also often felt behind the cervix, and may usually be distinguished from the lower portions of an ovarian tumor by their nodular character and fixation to the pelvic wall.

Distinctions between Ovarian and Ascitic and other Fluids.
—The varying physical characters of ovarian fluid have
already been mentioned (see p. 257).   The dark ropy fluid
of high specific gravity (1018 upwards) is found only in
ovarian cysts.   Ascitic fluid is limpid and yellowish, con-
taining a considerable quantity of albumen, and having
usually a specific gravity of from 1010 to 1015, characters
which distinguish it from most ovarian fluid.   It may also
be recognized by its property of depositing fibrin sponta-
neously in a very delicate layer upon the surface of the
glass.   Ovarian fluid which physically resembles ascitic
fluid may be distinguished by the chemical character that
it contains paralbumen as well as albumen.*   Ovarian fluid
may also generally be recognized by its microscopical
characters.   It usually contains epithelial cells of various
forms, cholesterin, leucocytes, and often large granule
masses.   But of special importance is the granular ovarian
cell (Fig. 56, *a*), described by Dr. Drysdale, of Philadel-
phia, as being pathognomonic of ovarian fluid.   This con-
tains a number of fine granules, but no nucleus.   Its size
varies from $\frac{1}{5000}$ to $\frac{1}{2500}$ inch, but the size commonly met
with is about that of a leucocyte.   From a leucocyte, how-
ever, it is distinguished, according to Dr. Drysdale, by the
addition of acetic acid.   This renders the leucocyte very
transparent (Fig. 56, *c*), and nuclei, varying in number ·
from one to four, become visible, while the ovarian cell is
simply rendered rather more transparent and its granules
more distinct.   From the larger granule masses it is dis-
tinguished by being unaltered on the addition of ether.

* Add nitric acid to form a precipitate; shake up the fluid and
then boil it with about an equal quantity of acetic acid. Boil another
portion similarly with a similar quantity of water for the sake of
comparison. If the precipitate by nitric acid is partially dissolved or
gelatinized by the acetic acid, the presence of paralbumen is shown.

Dr. Drysdale is said himself not to fail in diagnosis, but other observers have reported similar cells found in
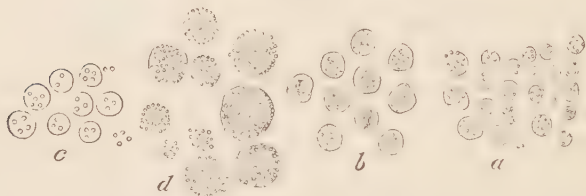
Microscopic Characters of Ovarian Fluids.—(After Drysdale.) *a*, granular ovarian cell of Drysdale; *b*, leucocyte before addition of acetic acid; *c*, leucocyte after addition of acetic acid; *d*, compound granular cell or inflammatory corpuscle of Gluge.

fluids not ovarian. Ascitic fluid under the microscope generally shows only cells of the peritoneal endothelium, leucocytes, and fibrin. For the characters of the fluid of a fibro-cystic tumor see p. 209, for those of parovarian fluid see p. 258. If the fluid is found purulent, when no previous tapping has taken place, it is more likely to come from a dermoid cyst.

If the existence of a large cyst is established, it is necessary to distinguish between an ovarian tumor and several other conditions which have sometimes been mistaken for it. *Pregnancy with hydrops amnii* is usually distinguished from ovarian dropsy alone by the condition of the cervix, but has not unfrequently been mistaken for an ovarian cyst associated with pregnancy. In the latter condition, however, the body of the uterus ought to be made out on bimanual examination as distinct from the cyst. The varying consistency of the tumor of hydrops amnii, from alternate contraction and relaxation of the uterus, will be distinctive if observed, but, in some cases of overdistension, observers have failed to detect it. A *distended bladder* is distinguished by the use of the catheter, which should al-

ways be employed if an apparently central and unilocular cyst of moderate size be discovered. *Hydronephrosis* and *pyonephrosis* have led to mistakes. The tumor formed by either of these commences from the region of the kidney, pushes the colon in front of it, and rarely completely fills the abdomen towards the opposite groin, or comes into close relation to the uterus. The fluid of hydronephrosis may sometimes, but not always, be recognized by the presence in it of urea or creatin. *Hydatid tumors* would more often lead to error, but for the fact that they very rarely occur in the pelvis, and generally commence from the region of the liver, or the upper part of the abdomen. The best test is the microscopical examination of the fluid, which, from its physical character, may be mistaken for that of a parovarian cyst. I have met with one case in which the cyst had none of the tenseness usual in hydatid tumors, and no sign of hydatids was discovered on microscopical examination of the fluid. The cyst afterwards suppurated, and was eventually removed by Mr. Jacobson in Guy's Hospital. It was still thought to be parovarian, until, at the autopsy, its association with smaller hydatid cysts was discovered. In a case under my own care, the cyst, having become inflamed, closely simulated a large ovarian tumor, and a thick brownish fluid was evacuated by tapping. Decomposition then occurred, and hydatids escaped when the cyst was laid open. The patient recovered after insertion of a large drainage-tube, and frequent injections with a weak solution of iodine. Multiple hydatid cysts of the omentum may also closely resemble a multilocular ovarian tumor.

Encysted Serous or Purulent Fluid may closely resemble an ovarian cyst. Such a collection may attain to considerable size, especially when due to cancer or tuberculosis of the peritoneum. Sometimes large encysted collections of pus are formed in a late stage of septic peritonitis. I have

met with one case in which a large pus-containing cyst behind the uterus, and reaching as high as the umbilicus, was secondary to cancer high up in the rectum. The resemblance will generally be to an ovarian cyst associated with peritonitis, and fixed by adhesion. If the pseudo-cyst is irregular in shape, sending prolongations among the intestines, it may often be distinguished by the fact that the fluid thrill extends beyond the area of dulness; but, in general, the diagnosis must be made in great measure by the history and course of the affection. When the effusion is serous, and due to simple peritonitis (the serous perimetritis of Dr. Matthews Duncan), it may be distinguished by its sudden appearance in connection with acute inflammatory symptoms, and by its gradual diminution and disappearance. If the fluid be drawn off, it will generally be found to contain flakes of lymph, and will spontaneously deposit a coagulum of fibrin. *Retroperitoneal cysts* have occasionally been found, and are to be distinguished by their place of origin, and want of connection with the uterus. *Advanced extrauterine fœtation* will be recognized by a history of pregnancy not ending in delivery. The hard parts of the fœtus will be felt in the midst of the fluctuating cyst, or the fluid will have been absorbed, and the whole tumor be firm and irregular.

When a considerable tumor exists, but no manifest fluid thrill can be felt over any large part of it, the point requiring most care is the diagnosis whether the tumor is *uterine or ovarian*. For this a careful exploration by the sound of the position of the uterus and its mobility, with an exploration of the mode of attachment of the tumor to the uterus is necessary. The method of diagnosis has already been described (see pp. 25, 207). *Cancer springing from the omentum*, or elsewhere in the abdomen, or even medullary cancer of the kidney, may form a large tumor, sometimes reaching into the lower part of the abdomen,

and forming deposits in the pelvis. Such a tumor is not fluid, though it may be soft and semi-fluctuating, and is often associated with ascites. Some portion of it is generally fixed by adhesion. If the ascitic fluid be examined, it may indicate the presence of blood, obviously or by spectroscope, or show the clusters of cells described at p. 271. The age of the patient, and the amount of emaciation and cachexia present, will greatly aid the diagnosis. *Leukæmic enlargement of the spleen* may form a tumor, which becomes displaced into the lower part of the abdomen, but is easily recognized by its sharp hard border, generally broken by a depression. *Fecal accumulations* are distinguished by their position, unconnected with the uterus, by their doughy feel, and by the effect of purgatives and enemata.

Diagnosis in the Early Stage.—In the early stage of an ovarian tumor, while it is smaller than a fœtal head, the method of diagnosis is somewhat different. If the tumor is free from adhesion, the diagnosis is usually easy. A well-defined, globular, and elastic tumor is felt on bimanual examination behind, in front, or at one side of the uterus, movable to some extent, but tethered to that organ. A parovarian cyst, or hydrosalpinx, may be confounded with an ovarian cyst, and can hardly be distinguished except by examination of the contained fluid. A *subperitoneal fibroid of the uterus* is known by its hardness, and generally by its mode of attachment to the uterus. If a small ovarian tumor is surrounded by adhesions, especially when it lies behind the uterus, it may be very difficult to distinguish it from *hæmatocele*, or a swelling due to pelvic peritonitis. The best guide is the history and course of the affection. With *pelvic cellulitis* an ovarian tumor is less likely to be confounded. In *extrauterine fœtation in the early months* there will usually be a history of amenorrhœa for a time, with general signs of pregnancy, although sometimes menstruation is never interrupted. In any of the forms of tubal

pregnancy, the amenorrhœa, if any occurs, is apt to be followed by irregular hæmorrhage, and violent spasmodic pain, while pain sometimes exists from the very first. The uterus will be notably enlarged; and strong arterial pulsation will be felt near the cyst, which usually occupies the retro-uterine fossa. Sometimes ballottement in the cyst, or signs of fetal life may be detected, or the diagnosis may be decided by the expulsion of a decidua from the uterus. After the death of the fœtus, the tumor tends to diminish in size, and to become harder. *Small hydatid cysts* in the pelvis are very rare in Britain, and can scarcely be diagnosed, except by examination of the fluid.

Diagnosis of Adhesions.—The general mobility of a tumor of moderate size may be tested by grasping it with both hands through the abdominal wall, and moving it from side to side. In the absence of adhesions in front, if distension be not very great, the abdominal walls can be freely moved over the tumor, and also lifted up, to some extent, from its surface. Frequently parts of the tumor may be observed to glide downwards under the surface on deep inspiration. All these signs are more easily detected in multilocular tumors, or those containing solid matter, than in those which are nearly unilocular. Measurements should be made of the distance of the umbilicus from the anterior superior spines of the ilia, and from the edges of the ribs on each side. Any marked inequality in these distances not accounted for by the shape of the tumor renders the existence of adhesions in front probable. A friction-sound on respiration indicates the absence of any firm adhesion over the area where it is heard, and is generally due to prominent vessels or other inequalities on the surface of the tumor.

If a portion of a tumor descends into the pelvis behind the cervix or elsewhere, and cannot be pushed up, it may either be adherent or simply fixed by pressure. The degree of fixation is estimated by observing whether the mass yields

at all to pressure from the vagina or rectum.   If the whole
pelvic roof is indurated, and the uterus fixed, firm adhesions
in the pelvis are indicated.   If the uterus cannot be moved
by means of the sound separately from the tumor, it may
be inferred that the tumor, if ovarian, is closely connected
with the uterus : and this presumption is increased if the
uterus be much drawn upward, and its cavity elongated.   In
estimating the attachment of the tumor to the uterus, rec-
tal exploration should be used, and it is often of advantage
to put the attachments on the stretch by drawing down the
cervix (see p. 25).   The probability of intestinal and other
adhesions posteriorly can only be inferred from a history of
peritonitis.   Omental adhesions cannot be diagnosed, but
are of little consequence.

Diagnosis of Malignancy.—The greater the proportion of
solid material in a tumor, the greater is its tendency towards
malignancy likely to be.   The age of the patient is a useful
guide, and valuable evidence is afforded by a cachexia and
emaciation out of proportion to the size and duration of the
tumor.   A very large amount of ascitic fluid, in combina-
tion with a comparatively small and firm tumor, renders
probable at least some approximation towards malignancy.
If signs of pelvic adhesion be found, with much solid mat-
ter at the base of the tumor, and nodular masses behind
or around the cervix, and if much cachexia be also present,
the evidence of malignancy is very strong.   If grapelike
clusters of cells, of very varying shape, many of which have
multiple nuclei, be found in fluid withdrawn from a cyst,
they indicate that proliferating papillary growths are present,
and that the tumor should be immediately extirpated, if
possible.   If similar groups of cells are found in ascitic fluid,
they indicate that cancer has reached the peritoneum from
the ovary or from some other source, and that ovariotomy
will probably be too late to prevent recurrence.   A similar

indication is given if blood be detected, either obviously or by spectroscope or other evidence, in ascitic fluid.

Treatment.—The great success of ovariotomy has reduced the treatment of ovarian tumors, in the great majority of cases, to ovariotomy as a curative, and tapping as a preliminary or palliative measure. Since tapping is not entirely without risk, especially if not performed antiseptically, it is better if a tumor be positively diagnosed as ovarian and multilocular, and if it be not of such enormous size as to cause excessive pressure, to perform the major operation without preliminary paracentesis. If, however, the tumor has, by its pressure, caused great œdema of legs and abdomen, and much interference with the functions of kidneys, heart, and lungs, and if it appears to contain one considerable cyst, it is generally preferable to tap as a preliminary measure, in order to give the organs time to recover themselves, and to prevent the shock of the operation being increased by too extreme a change in abdominal pressure. If a cyst be apparently unilocular and the patient be young, and the tumor of slow growth, it is desirable to tap once before proceeding to ovariotomy, since such a cyst may prove to be parovarian, and may then perhaps be cured by a single tapping. Paracentesis may also be required in cases where the diagnosis is doubtful, and as a palliative measure, in those in which ovariotomy is decided to be impracticable.

The Operation of Paracentesis.—If ovariotomy is to be performed with antiseptic precautions, any preliminary paracentesis must be so also. The instrument used should be about ⅓ inch in diameter, and may be either an ordinary trocar and canula, or Mr. Spencer Wells's syphon canula, which has a bevelled extremity, and a cutting edge for half its circumference, so that it cuts a valvular opening. The latter instrument diminishes the risk of any fluid escaping

into the peritoneal cavity, during the momentary interval between the puncture and the withdrawal of the trocar.

For the operation the patient should be placed on her side, with her head rather low, to avoid the occurrence of faintness from sudden diminution of abdominal pressure. One or more pails must be provided to receive the fluid. A small incision should be made with a scalpel just through the skin, before the trocar is inserted. If the fluid is conducted into the pail by means of a long tube, the antiseptic method is not carried out, unless a second spray-producer is used to protect the extremity of the tube, as well as that for the surface of the abdomen. I have generally therefore used no flexible tube, but merely conducted the fluid into a pail by means of a mackintosh. If, however, the carbolic spray be not used, a long india-rubber tube should be previously attached, either to the siphon canula, or to a short tube which is fitted into the ordinary canula, at the moment when the trocar is withdrawn. In this way the entry of air is rendered less probable, and the siphon action assists the evacuation of the fluid. If a large amount of ascitic fluid be present, in addition to a tumor, it is better to make a small incision through the abdominal wall with a scalpel, until the peritoneum is just divided, and then to pass in through the opening a large gum-elastic catheter, which should be a new instrument and thoroughly disinfected with carbolic acid. In this way there is no risk of wounding tumor or intestines; the ascitic fluid is drawn off first, the outline of the tumor can then be exactly explored, and it also can be afterwards tapped, if necessary.

Paracentesis is generally an innocuous operation, but occasionally it is followed by inflammation of the cyst, or of the peritoneum. This generally arises from access of air in absence of antiseptic precautions, and is especially likely to occur if the operation is performed in a place exposed to any septic influence.

Indications for Ovariotomy.—It has generally been considered preferable not to operate until the tumor has attained some considerable size, and has begun seriously to inconvenience or disable the patient, or to tell upon her general health. A person in active health usually bears a severe operation worse than one accustomed to an invalid life. Moreover the healthy peritoneum is more prone to inflammation, especially from a septic cause, while after great and prolonged distension, and protracted slight irritation, it acquires a certain tolerance. This rule, however, may be partially modified in future as regards operations performed antiseptically. In any case the operation should be performed before distension is great enough to embarrass greatly the lungs, heart, or kidneys, or produce œdema of legs and abdomen. In the case of single women, to whom the increase of size is an annoyance, it may justly be performed earlier. If symptoms of inflammation or partial necrosis of the cyst supervene its removal should not be delayed. If acute peritonitis occurs, it may be desirable to wait awhile, until the symptoms have subsided ; but ovariotomy, if practicable at all, should generally be performed within a few weeks, before the adhesions have become so firm as to render their separation very difficult. If there is an indication by any of the signs previously enumerated (p. 271) that the tumor is of a kind tending towards malignancy, it should be removed, if possible, before any infection of other tissues has occurred.

The chief *contraindications* are signs of malignancy in the tumor, accompanied by extension of the growth to surrounding parts, or evidence of very unyielding and extensive pelvic adhesions, especially when the lower portion of the tumor is solid, or when the uterus is involved in the adhesions and completely fixed. Coils of intestine are sometimes recognized as adherent in front of the cyst, especially when a previous tapping has been followed by peritonitis ; and this condition would indicate the probability of exten-

sive visceral adhesion in other parts also. Elongation of the uterus, and its close connection with the tumor, render it likely that the operation will be difficult, but do not necessarily contraindicate it. Adhesions to the abdominal wall are of comparatively little moment. In doubtful cases the age and general condition of the patient, and the state of the kidneys and other viscera, are important elements in the decision.

The Operation of Ovariotomy.—The room where the operation is performed, as well as the operator and his assistants, should be perfectly free from septic contamination, and no one should be present in it who has within the last few days attended any post-mortem or dissecting-room, or seen any case of infectious disease, especially erysipelas, septicaemia, or pyaemia. It is not yet proved that even the use of the antiseptic method will enable this precaution to be omitted with safety; there is rather some evidence that there may be contagious material so virulent as to resist the effect of carbolic acid. The room should be warm, but need not be overheated. The patient is placed in the dorsal position close to a good light, and the shoulders being slightly raised. In a private house two dressing tables may be conveniently used, one of which is placed crosswise, to support the head and shoulders. The abdomen should be washed with soap and water, and afterwards with carbolic lotion. The hair on the pubes should be shaved, to facilitate the close application of antiseptic dressings, and the bladder evacuated. For cleanliness it is convenient to cover the abdomen with a piece of mackintosh, in which an oval aperture of sufficient size has been cut, and its edges spread with adhesive plaster, to attach it at all points with the skin. In this way all fluids are conducted into the vessel ready to receive them.

The results obtained by Keith, Thornton, Bantock, Shrœder, and others, by the application of Lister's anti-

septic method in its fullest extent to ovariotomy, showing
on a considerable number of cases a mortality varying from
six to fourteen per cent., appear to prove that it is possible
thus to surpass even the success of Spencer Wells, who, by
extreme care in excluding septic contamination, but with-
out carbolic spray, had, in a much more extensive series of
cases, a mortality of about twenty-five per cent. In large
general hospitals, on the other hand, where septic influence
is more difficult to exclude, the mortality in the hands of
the surgeons has been until quite recently not less than fifty
per cent., and is still very much greater than that of the
specialists. The experience gained by operating frequently
is, however, an important element in success, and it cannot
be doubted that a patient who undergoes the operation at
the hands of a surgeon not a specialist has her chance of
death notably increased.

For ovariotomy one or two steam spray-producers are re-
quired, capable of throwing a very fine and widespread
cloud of spray, and of working for two or three hours, if
necessary, without the boiler becoming exhausted. They
are to be supplied with a solution of pure carbolic acid,* of
the strength of 1 in 20, or one sufficient to produce a spray
containing about 1 in 40, after dilution by the steam.   A
spray of thymol (1 in 1000) has been used as less irritating
than carbolic acid to the peritoneum ; but it appears that
thymol is not so absolutely reliable an antiseptic as
carbolic acid.   The silk or gut for sutures should be
wound upon reels, and with the instruments should be
kept immersed in trays filled with carbolic solution (1
in 20).   As an anæsthetic Mr. Spencer Wells prefers
the bichloride of methylene, administered by Junker's
inhaler, as being safer than chloroform, and least likely
to cause vomiting.   Mr. Keith chooses ether, with the
object of avoiding vomiting, but it is apt to irritate the
lungs if any bronchial complication exists.   Others prefer

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* Calvert's Carbolic Acid, No. 2, may be used.

the mixture of alcohol one part, chloroform two parts, and ether three parts, which may be administered with Ormsby's inhaler. Chloroform is apt to depress the pulse if the operation prove long and difficult. Besides the assistant who administers the anæsthetic, one other at least is required, who stands on the left side of the patient opposite the operator, and is ready to protect the intestines with soft sponges, and prevent their protruding. There must also be nurses to wash sponges in warm carbolic solution (1 in 40), and hand them back to the operator. Sponges should be counted before and after the operation, to insure that none are left in the abdomen.

The incision is to be made in the linea alba. It should be at first of moderate length, not exceeding four or five inches, nor passing above the umbilicus. It may afterwards be extended upwards, if required. Mr. Spencer Wells has found the mortality to be notably less when the tumor could be extracted through an incision not exceeding these dimensions. It is preferable, however, to extend the incision rather than to separate out of sight adhesions to omentum or intestines, which are likely to cause subsequent hæmorrhage. Bleeding from vessels in the abdominal incision should be checked before the peritoneum is incised. For this purpose, Mr. Spencer Wells's hæmostatic forceps, having a catch at the handle, are very convenient, and the operator should be provided with a considerable number of them. These are left attached, while the operation proceeds. Ligatures of fine carbolized gut may also be used, if necessary. The fibrous structure of the linea alba and the peritoneum are then successively pinched up and divided upon a director. If the incision is extended downwards near the pubes, it is preferable to use two fingers as a director, to avoid any risk of injuring the bladder. The cyst is generally recognized by its bluish appearance, but, when it is firmly adherent to the abdominal wall, difficulty

may be found in ascertaining when the peritoneum has been divided, and the operator may peel off the parietal peritoneum, mistaking it for the cyst-wall. In case of great doubt, two methods may be followed : (1) to ascertain whether the supposed cyst-wall can be peeled off at the situation of the umbilicus ; (2) to extend the incision till the point is reached where the cyst leaves the abdominal wall.

Before tapping the tumor, the hand may be introduced between it and the abdominal walls, and swept round on all sides, to separate any adhesions existing in front. If, however, the adhesions be found very firm, and especially

Fig. 57.
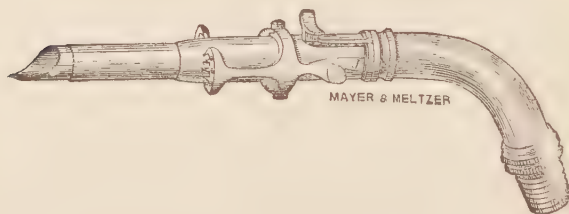
Spencer Wells's Ovariotomy Trocar.

if the cyst-wall be thin or friable, it is better first to empty the tumor. A large trocar (Fig. 57), having claws attached, to fix the cyst-wall to it, is now plunged into the tumor. In case of a multilocular tumor the spot should be chosen where the largest cyst appears to be situated. After puncture of the cyst the inner tube is pushed forward to guard the point of the trocar. The fluid is carried to a vessel by a flexible tube attached to the canula, and care must be taken that none of it enters the peritoneal cavity. If the nature of the tumor still remain doubtful, after its exposure, a small trocar should be used in the first place. As the tumor empties, it is drawn forward in the grasp of the claws of the

trocar, so as to bring the opening outside the abdomen. If secondary cysts remain large enough to prevent the withdrawal of the tumor, it is best to remove the trocar, enlarge the opening, and fix at each side of it a pair of cyst forceps (Fig. 58), to hold it forward. The hand is then introduced through the opening, and the secondary cysts broken up by the fingers, or the trocar guided to tap them.

For the ligature of bleeding vessels or bands of adhesion of no very large size within the peritoneum, it appears preferable to use ligatures of carbolized gut, not excessively fine. Many operators, however, prefer fine silk, which should be carbolized, if the operation is performed antiseptically. Special care is required to guard against subsequent hæmorrhage in the case of omental adhesions; and if there is a broad surface adherent it is a good plan to divide it into sections, and tie each separately, before dividing the omentum with scissors. Other strong bands of adhesion may be tied before division in a similar manner. Adhesions to intestine, stomach or liver require special caution in their separation, which should be effected, if possible, by gentle traction, or by the finger-nail, or handle of the knife. If, however, a portion of cyst-wall be very firmly adherent, it is preferable to cut the rest of the tumor away from it, and leave it attached. Firm adhesions within the pelvis are likely to lead to the greatest difficulties, and, in some cases, render it impossible to complete the operation. If they cannot be separated by the fingers, the plan of enucleation should be tried. A transverse incision is made through the outer wall of the cyst, a little above the adherent surface; the fingers are introduced through the opening, and the cyst-wall split into two layers, of which the outer is left attached, and treated as a pedicle, by ligature or otherwise. After removal of the tumor minute care must be taken to arrest all hæmorrhage. Oozing from even a considerable vascular surface, such as that produced by de-

tachment of an adhesion to the uterus, may be stopped by successively seizing the bleeding points by tenaculum forceps and tying them with carbolized gut or fine silk. In

Fig. 58.

Fig. 59.

Fig. 58.—Nelaton's Cyst Forceps.
Fig. 59.—Spencer Wells's Ovariotomy Clamp, with Forceps.

extreme cases the galvanic, benzoline, or actual cautery have been used, but are very rarely necessary.

In the *treatment of the pedicle* the choice lies between the extraperitoneal and intraperitoneal method. In the former the pedicle is fixed by a clamp, or some equivalent means, in the lower angle of the wound, and the tumor cut away. The most convenient form of clamp is that shown in Fig. 59, which allows clamps of all sizes to be tightened

by the same forceps. The smallest clamp which will in-close the pedicle should be chosen. Before the introduction of the antiseptic method in ovariotomy, the treatment of the pedicle by clamp, except in cases in which it was too short or broad to allow a clamp to be applied, had given by far the best results in the hands of most operators. Most of those, however, who have adopted the antiseptic method have regarded the intraperitoneal treatment of the pedicle as its necessary supplement, and most brilliant results have thus been obtained. Mr. Spencer Wells, however, still sup-ports the use of the clamp, and it is by no means incom-patible with the use of antiseptic dressings. I have found its chief inconvenience to be that, when the pedicle is very thick, the period of separation of the clamp may be pro-longed to three weeks or more, instead of being completed in about ten days, as it is in the absence of antiseptic pre-cautions.

In the intraperitoneal method, the plan most usually adopted is to transfix the pedicle with a ligature of strong, but not excessively thick, carbolized silk,* and tie it in two or more sections. If necessary the whole pedicle may after-wards be encircled by one of the ligatures, and the ends are then cut short. Care must be taken that the loops cross each other. Sufficient capillary circulation is after-wards restored to maintain the nutrition of the stump be-yond the ligature.

The intraperitoneal method has the advantage of short-ening the cure, and avoids the leaving of any weak point in the abdominal wall. It is open to one possible risk, namely, that the stump may become adherent to intestine, and so lead to intestinal obstruction. To avoid this, if the pedicle is long, the stump beyond the ligatures may be in-

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* The silk is carbolized simply by soaking it for twenty-four hours in carbolic solution (1 in 20).

cluded in one of the sutures of the external wound, so as to
fix it against the abdominal wall.   Mr. Thornton has intro-
duced the plan of stitching the anterior face of the stump
to the anterior surface of the broad ligament, so that its cut
surface is drawn forward ; but to this method there is the
drawback that a vessel may be punctured.

The division of the pedicle by cautery is still practiced
with excellent results by Mr. Keith, in conjunction with the
antiseptic method.   For this purpose a temporary clamp is
used, having a shield of non-conducting material to protect
the soft parts beneath.   The pedicle is divided, and then
thoroughly seared down to the level of the clamp.

If the cyst is found to descend between the layers of the
broad ligament, and below the level of the fundus uteri, so
that its lowest portion cannot be drawn out, the choice will
generally lie between extracting it by enucleation, if this
is practicable, or tying it in segments, as low down as pos-
sible, and leaving a portion of its surface attached.   If,
however, a cyst is completely unilocular, as for instance a
parovarian cyst, the aperture made by the trocar may be
stitched to the edges of the abdominal wound, and the cyst
treated by drainage (see p. 283), after which it will shrink
up.

Before the abdominal wound is closed, all parts of the
peritoneum, especially its dependent portions, must be thor-
oughly cleansed by a succession of soft sponges, wrung out
of warm carbolic solution, from all fluid, blood, or clots ;
and upon the effectual performance of this "toilette" the
success of the operation largely depends.   While the sutures
are inserted into the abdominal wound a large, flat sponge,
previously selected for the purpose, should be placed beneath
it, to prevent any blood from the punctures entering the
abdomen, and to avoid any risk of the intestines being
wounded.   The sutures may be of carbolized silk, or, for
greater security against their producing any irritation, either

of silver wire or silkworm gut, as used by Dr. Bantock.
Mr. Spencer Wells's plan is to thread a silk suture with a
straight needle at each end, and, holding the needles in
forceps, to pass them from within outwards, including about
half an inch of peritoneum, and bringing them out rather
close to the margins of the wound. Silkworm gut may very
conveniently be used in the same way. The edges are thus
accurately adapted without any superficial sutures. In
bringing the wound together care must be taken to express
air as completely as possible, and, if practicable, to draw
down the omentum so as to cover the intestines. The anti-
septic dressings are most easily kept in perfect apposition to
the skin, if the deepest layer of carbolized gauze is moistened
with carbolic oil (1 in 20). Some, however, prefer to use a
layer of thymol gauze next the skin, to avoid irritation.
The dressings are secured by broad strips of strapping reach-
ing to the sides, but not round the back, and over these a
broad band of flannel, previously passed under the back, is
secured by safety pins. The dressings can then be changed
without disturbing the patient.

The use of *abdominal drainage* has been, in great measure,
superseded by the antiseptic method, since not only is a
moderate effusion of sanguineous serum in the abdomen
thus rendered generally innocuous, but, if the discharge is
allowed to escape and soak the dressings, the completeness
of antiseptic precaution is apt to be destroyed. If the car-
bolic spray be not used at the operation it is desirable,
whenever the adhesions separated are very extensive or
very vascular, so that much oozing of blood or serous fluid
may be expected, or if any inflammatory or septic fluid has
escaped into the abdomen, to place in the lower angle of
the wound one of Keith's glass drainage-tubes (Fig. 60).
It should be chosen of such a length that its lower extremity
rests at the bottom of the pouch of Douglas. The top of
the tube is covered by a cup-shaped sponge, wrung out of

carbolic solution, and over this a piece of gutta-percha skin
is secured by strapping. The dressings are so arranged
that the tube can be examined without disturbing them;

Keith's Drainage-Tube for Ovariotomy.

and, at intervals, the fluid in the tube is extracted by a
piece of elastic tubing, attached to a syringe. After a few
days, when the discharge has nearly ceased, the tube may
be removed. Dr. Bantock still employs drainage, notwith-
standing the antiseptic method, when much effusion is ex-
pected, and has thus attained admirable results. Its use,
under these circumstances, however, may require that the
dressings should be changed, with antiseptic precautions, at
intervals of a few hours for the first day or two. The use
of drainage through the pouch of Douglas into the vagina,
and that of antiseptic injections into the abdomen, have
been found, on the whole, not to be advisable.

If drainage be not used the dressing may generally be
left undisturbed till the fifth, sixth, or seventh day, when
the sutures are removed. After this frequent dressing is
necessary, if a clamp has been applied, and the antiseptic
method has not been employed. Towards the end of the
first twenty-four hours a little milk or barley-water may be
given; but, if vomiting is troublesome, recourse should be
had early to nutrient enemata, and the stomach left at rest.
Morphia or opium is to be given by the rectum or subcu-
taneously in sufficient amount to keep pain in check after
the operation. In case of considerable elevation of temper-
ature, a condition generally due to peritonitis of septic ori-
gin, advantage has often been found from the use of Thorn-
ton's ice-water cap.

Other Modes of Treatment, in the present day, are to be thought of only when ovariotomy is judged impracticable, or when, after exploratory incision, it is found that the tumor cannot be removed. Insertion of a large drainage-tube through an incision in the linea alba, and washing out the cyst frequently with antiseptics,* is a plan which may be adopted if a cyst is found, on tapping, to contain pus ; or if, after incision, it proves to be inseparably adherent to the abdominal wall. If the tumor consists solely or mainly of one cyst, this method may lead to cure. If the cyst fails to close up under this treatment, it may be desirable, if possible, to make a counter opening by the vagina. Stitching the walls of the cyst to the edges of the abdominal wound, and maintaining a free opening for drainage, have sometimes proved successful, when it has been found impossible at the operation to remove the tumor. Injection of iodine may be tried in a tumor mainly unilocular, if ovariotomy is contraindicated. Three ounces of tincture of iodine, with an equal quantity of water, may be injected into the cyst, and, after a few minutes' interval, withdrawn again as far as possible.

Electrolysis has in some cases produced diminution, and even reported cure of ovarian tumors, and may be tried when the radical operation is impossible. It is not, however, without risk of setting up inflammation, and the tumor is apt to enlarge again after apparent arrest or cure. A battery of eight or ten good-sized cells should be used, and one pole introduced into the tumor by means of an insulated needle, the other electrode being applied to the abdomen or vagina. It is not yet fully ascertained which pole it is best

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* A weak solution of iodine (Tr. Iodi. ℥ij ad Aq. Oj) may be used. If, however, the carbolic spray be employed, it is best to use for washing out the cyst a solution of sulphurous acid of the strength of one part of the pharmacopœial acid in ten or twenty.

to insert, but probably the positive pole is more effectual. The applications should last from five to ten minutes, and may be repeated at intervals of one or several days, if no irritation is set up. The treatment should be continued for some months. If a cyst is very tense, preliminary tapping is desirable, otherwise oozing may take place through the punctures.

DERMOID CYSTS OF THE OVARY.

Pathological Anatomy.—The term of dermoid cyst, though not a strictly appropriate one, has been applied to cysts of the ovary whose inner surface is a structure resembling skin, generally containing sebaceous and sometimes sweat-glands, and often provided with numerous hairs growing in hair-follicles. In the cellular tissue beneath, true bones are often formed, frequently having teeth, and sometimes more or less resembling some definite bones of a fœtus. Teeth may also be found separately in the tissue, or be cast off into the cyst, within which a large number of them may be accumulated. They are sometimes well formed, but more frequently rudimentary. In rare cases striated muscular fibre, or gray nerve-substance, has been found in the cyst-wall. The cyst is generally single, or appears to be divided into compartments by the growth of septa from its walls. The contents of the cyst are generally a thick gruel-like material, made up of sebaceous secretion and cast-off epithelial cells, with the addition frequently of cast-off hairs, sometimes to a considerable amount. Cholesterin may also be present in large quantity.

Causation.—The constant situation of these cysts in the ovary shows that they cannot be the produce of an included twin ovum, for such an ovum would be attached to some more external part. The occurrence in them of structures other than epithelial, as well as their situation, distinguishes them from cysts formed by abnormal epidermic involution,

like the dermoid cysts of the orbit. Their origin can only be ascribed to an abnormal formative energy of one of the ovules in the ovary, constituting an imperfect degree of parthenogenesis or development of an ovum without impregnation. In comparatively very rare cases similar tumors have been formed by erratic development of tissue in other parts of the body.

Dermoid cysts of the ovary have often been found in very young children, but they more frequently come under observation within a few years after the age of puberty. It is probable that, in at any rate a large proportion of cases, the tumor commences in fetal life or soon after birth, while formative energy is specially active, and that it takes on a more active growth when the ovary becomes developed at the age of puberty. Dermoid cysts are occasionally found associated with ordinary ovarian cystomata, and it is possible that, in such cases, the presence of the dermoid tumor may have been the starting-point of irritative stimulus.

Results and Symptoms.—Dermoid cysts are slow in progress, and do not generally pass beyond a small or moderate size. In exceptional cases they may attain a large size, from the accumulation of many years' secretion or from suppuration of the cyst. They are more prone than ovarian cystomata to undergo inflammation and suppuration, and to contract adhesions with surrounding parts. Fistulous openings may then be found, communicating with the rectum, bladder, surface of abdomen, or other parts, through which the contents of the cyst, with hair, teeth, and bones, may be discharged. Rupture into the peritoneal cavity is rare. It is seldom that the cyst is completely evacuated spontaneously, but suppuration and discharge may continue for years

Diagnosis.—The existence of a dermoid cyst may be suspected if a tumor of slow growth be found, which first attracted notice soon after the age of puberty, or has existed

indefinitely, especially if hard masses like bone can be felt in parts of it, while no very manifest or superficial fluid thrill can be detected. A similar opinion may be held if, in a tumor like that just described, signs of inflammation appear, while the tumor rapidly increases and fluctuation is developed. Positive diagnosis can generally only be made after spontaneous or artificial evacuation of some of the contents.

Treatment.—If the tumor, after becoming inflamed, points externally, it is desirable to make an incision, or, if a fistulous opening exists, to enlarge the opening and evacuate the contents as completely as possible. Tufts of hair may be extracted by a small blunt hook. A large drainage-tube should afterwards be inserted, and the cavity washed out regularly with a weak solution of iodine or other antiseptic. Dr. Barnes recommends light cauterization of the interior of the cyst, to alter its character, and cause it to contract. If the tumor be enlarging rapidly, without having formed fistulous openings, or if the commencement of inflammation in it be suspected, it should be removed, if possible, by ovariotomy. This operation has even, in some cases, been successful after a fistulous opening had existed for a long period.

FIBROID TUMORS OF THE OVARY.

A true fibro-myoma having its origin in the ovary is very rare, although it has occasionally been observed. In some instances, tumors of this structure, which appear to belong to the ovary, may be outgrowths from the uterus, or may originate in the muscular fibres spreading out from the uterus into the broad ligaments. The proportion of muscular fibres is less when the growth is of ovarian origin than in uterine tumors; and, in some instances, fibrous tissue largely preponderates. Some solid tumors of the ovary belonging to the sarcomatous groups also consist mainly of

fibrous tissue, and do not show malignancy, but these are also rare.

Treatment.—Non-malignant solid tumors of the ovary are generally slow in progress, and but rarely require interference, but ovariotomy may in some cases be called for, if the tumor attain a large size, or be the source of great pain or distress. In most cases it will be impossible, before the operation, to distinguish such a growth with absolute certainty from a fibroid outgrowth from the uterus.

CANCER OF THE OVARY.

The ovary occupies a rather exceptional position among organs of the body, as being a not unfrequent seat of secondary, as well as of primary, cancer. Primary cancer of the ovary is rarer as an independent disease than in conjunction with, or as a complication of, cystoma. When it occurs it often affects both sides, and sometimes appears in early life. Primary growths in the ovary which are clinically malignant, may have the structure either of sarcoma, originating in the stroma, or, more frequently, of carcinoma, which probably in most cases, if not always, has its origin from the Graafian follicles. The sarcoma may be of any variety, from the spindle-celled to the round-celled encephaloid form, while myxomatous or myxo-sarcomatous tissue is occasionally seen. The degree of malignancy varies according to the structure, but, in most cases, the prognosis is similar to that of carcinoma. True carcinoma of the ovary is generally of the encephaloid form, but occasionally the scirrhous variety occurs, sometimes consisting almost entirely of fibrous tissue, only a few cell masses being discoverable here and there. All solid growths in the ovary, whether fibroid, sarcomatous, or carcinomatous, commonly enlarge the whole organ equally.

Diagnosis.—The solid character of a growth in the ovary

should always excite the suspicion of its being malignant; and the suspicion is increased if both ovaries are affected, if pain is severe, if the growth is rapid, if a large quantity of ascitic fluid is present, or if the cachexia and emaciation of the patient, or local or general œdema, are greater than can be accounted for by the size of the tumor. The patient's age is also an element in diagnosis. If the tumor becomes fixed to the uterus and surrounding parts, and nodular masses are felt in its neighborhood, the diagnosis becomes pretty certain. Examination of the ascitic fluid may also give distinctive signs (see p. 272).

Treatment.—While the character of a solid ovarian tumor is only suspicious, and while it remains apparently free from fixation, it may be desirable to remove it by ovariotomy, and the prognosis will be more favorable if it turns out to be sarcoma and not carcinoma. In general, palliative treatment only is admissible.

TUBERCLE OF THE OVARY is very rare, and is almost always associated with tubercle elsewhere, especially in the uterus and Fallopian tubes.

CHAPTER IX.

DISEASES OF THE FALLOPIAN TUBES.

The Congenital Anomalies of the Fallopian tubes have been considered in connection with those of the uterus (see p. 47).

Salpingitis or Inflammation of the Fallopian Tube, commonly arises by extension of inflammation from the lining membrane of the uterus. Acute inflammation, proceeding to the formation of pus, is generally the sequel either of acute septic inflammation in the uterus, puerperal or otherwise, or of extension of gonorrhœal contagion. A collection of pus in the Fallopian tube is liable to lead to sudden and rapidly-fatal peritonitis, either through extension of inflammation by continuity to the ostium abdominale of the tube, through the outflow of pus by the same orifice, or through escape of pus after ulceration or rupture of the tube-wall, if the fluid is at first retained through want of patency in the tube. Peritonitis may probably also arise by transmision of inflammation, or by transudation of the fluid under pressure, through the walls of the tube. The more subacute or chronic form of inflammation in the tube is also very likely to set up a local peritonitis, and consequent adhesions.

The **Diagnosis** of inflammation of the Fallopian tube can generally only be a probable one, based upon the existence of a possible cause and the occurrence of the consequent peritonitis.

Obstruction or Obliteration of the Fallopian Tube is of frequent occurrence. It is most commonly due

to inflammation of the neighboring peritoneum, and may be produced either at the abdominal extremity of the tube by adhesion of lymph to the fimbriæ of its pavilion, or at any part of the tube in consequence of constriction or contortion resulting from bands of adhesion. Such a condition is the commonest cause of incurable sterility. Partial obstruction may also result from the presence of a small polypus, or other tumor, at the uterine extremity of the tube. A condition of partial obstruction is the usual antecedent of extrauterine fœtation. A total or partial obstruction, or the mere fixation of the tube, may lead to one form of inflammatory dysmenorrhœa, in which the ovum with a small quantity of blood effused on rupture of the Graafian follicle, falls into the peritoneal cavity, instead of being conducted into the tube.

DILATATION OF THE FALLOPIAN TUBE, in slight degree, may result from chronic inflammation of its lining membrane, which may produce also narrowing at other parts. In more considerable amount, it may be produced by any cause of obstruction to the outlet of menstrual blood from the uterus. Such an abnormal patency of the tubes constitutes the great danger which attends the injection of medicated fluids into the uterus. By allowing reflux of the menstrual blood, it is also one of the causes of periuterine hæmatocele (see p. 314). A considerable number of cases have been recorded, in which it has been concluded that the uterine sound could be passed for two inches or more along the Fallopian tube. In some instances, this has doubtless occurred, but some supposed cases are probably open to the explanation that the sound was first passed through a soft uterine wall, and that the opening remained for some time patent, so as to allow the sound to pass repeatedly in the same direction.

HYDROSALPINX, OR DISTENSION OF THE FALLOPIAN TUBE WITH FLUID, is the result of stricture or obliteration

of the tube at two points, one of which is generally the outer extremity. It appears that the obstruction is usually complete on the abdominal side of the distended portion, but is not necessarily so on the side towards the uterus, so that an occasional discharge of fluid through the uterus may take place. Accordingly, it is held by Schroeder, that the normal destiny of the small amount of mucus secreted by the tube is to be discharged through the ostium abdominale into the peritoneal cavity. The direction, however, of ciliary action, and of the movement of the ovum, would seem to indicate that the secretion normally is discharged into the uterus. Both Fallopian tubes are not uncommonly distended together. The distended tube is thrown into convolutions, the distension increasing towards its outer extremity. The size it attains is commonly only moderate, not exceeding that of a fœtal head, although a few cases have been recorded in which very large dimensions were reached. The fluid contained is usually clear, limpid, and yellowish, containing a considerable quantity of albumen. In some cases it contains blood.

Diagnosis.—The distinction between a distended Fallopian tube and a small ovarian tumor will often be difficult. At an early stage, the position of the tube will be more anterior, since a small ovarian tumor usually falls down behind the plane of the broad ligament. It may be possible to distinguish the convoluted outline of the tube, increasing in size outwards. When, however, the distension has passed beyond a certain point, the tumor will appear more globular. The occurrence of symmetrical swellings on both sides would be in favor of the existence of distension of the tubes. The nature of the contained fluid, if evacuated, may greatly assist the diagnosis.

The **Treatment**, when the diagnosis is established, is to puncture the swelling from the vagina by an aspirator or

small trocar. According to Sir James Simpson, the fluid does not again collect.

The most important disease of the Fallopian tube is tubal fœtation, but, since this is discussed in works on obstetrics, it will not be considered here. Among other affections to which the tube is liable, are small fibroid tumors, which are of little importance, and tubercle of its lining membrane, often associated with tubercle of the uterus.

HÆMATOSALPINX, OR DISTENSION OF THE FALLOPIAN TUBE WITH BLOOD, may result from hæmorrhage into the dilated tube, especially under the influence of the menstrual nisus. In some cases of hæmatometra, arising from occlusion of the genital canal, the tubes have also been found distended by retained blood, although cut off from the uterus by atresia of their orifices. Again, when a dilated Fallopian tube has been inclosed in a clamp after ovariotomy, hæmorrhage has occasionally taken place from it at menstrual periods. Hæmorrhage into the Fallopian tube does not, however, appear to be a normal event in menstruation, although when any morbid condition of the tube is present, it may readily occur during the menstrual hyperæmia.

CHAPTER X.

DISEASES OF THE UTERINE LIGAMENTS AND OF THE ADJACENT PERITONEUM AND CELLULAR TISSUE.

INFLAMMATORY and other affections of the uterus and its appendages are apt to give rise to inflammation of the cellular tissue in the vicinity of these organs, especially in the broad ligaments of the uterus, where it exists most abundantly, and also to inflammation of the peritoneum covering the inflamed tissues. In the very acute and septic form of metro-peritonitis, inflammation extends to the whole peritoneum, and is often rapidly fatal ; in the much more frequent cases, however, in which inflammation is less severe, it generally remains limited to the peritoneum of the pelvis and its vicinity. We have thus a pelvic or periuterine peritonitis and a pelvic or periuterine cellulitis. The terms of "*perimetritis*" to denote the former, and "*parametritis*" to denote the latter, have been introduced by Virchow, and widely adopted. The former was suggested by the analogy of the word pericarditis signifying inflammation of the serous covering of the heart, in contradistinction to which Virchow proposed the terms paracarditis, paratyphlitis, paranephritis, and parametritis, to denote inflammation of cellular tissue near the heart, cœcum, kidney, and uterus respectively. The words are thus divorced from their literal etymological sense, since, as they are now employed, perimetritis may be on one side of the uterus, and parametritis may extend all around that organ. They have, therefore, rather tended to introduce confusion. They have, also, the disadvantage of rendering ambiguous the adjective " peri-

metric," which would otherwise be preferable to the hybrid word "periuterine" in the simple sense of "around or near the uterus." On account of this ambiguity, I have retained the word "periuterine," although it would be etymologically more correct to use the word "circumuterine."

Neither pelvic peritonitis nor pelvic cellulitis often exists altogether independently of the other affection, for inflammation of the peritoneum extends more or less to the cellular tissue immediately beneath it. Again, the lymphatics bear an important part in all inflammation of cellular tissue, and these communicate freely with the peritoneal cavity. Not only, therefore, does cellulitis usually extend to the peritoneal covering of the part immediately affected, but, especially when of septic origin, it is apt to kindle a peritonitis which passes beyond that limit. The terms are, therefore, to be applied, not in an exclusive sense, but according as the affection of one or other structure is predominant.

Very diverse opinions have existed as to the relation and relative frequency of pelvic peritonitis and cellulitis. It was formerly assumed by many authorities that, when a swelling was detected on vaginal examination, the existence of cellulitis was established. It was proved, however, by Bernutz, from the evidence of numerous autopsies, not only that a localized swelling, tangible *per vaginam*, may be due to the effusion of lymph or serum and gluing together of intestines produced by peritonitis, but that this swelling may be situated at one side, or in front, of the uterus. Evidence derived from autopsy affords, however, no information as to the relative frequency of the two affections, since peritonitis is much more likely to prove fatal than cellulitis. Bernutz also went to an extreme in almost denying the occurrence of periuterine cellulitis, except in the form of phlegmon of the broad ligament. It is now, however, agreed by most authorities that, apart from parturition or abortion, or

operations upon the cervix uteri, pelvic peritonitis is much more common than cellulitis, and that, in a large proportion of the cases which do not end in suppuration, inflammation of the peritoneum is the preponderating element. In many instances, however, the characters of the two affections are largely combined.

PELVIC PERITONITIS, OR PERIMETRITIS.

Causation.—Pelvic peritonitis may originate by contiguity from inflammation of the uterus, ovaries, or Fallopian tubes, or may be secondary to cellulitis. It is frequently the sequel of suppression of menstruation, due to the effect of cold, in which case the primary condition is an acute or subacute endometritis and metritis, of which the arrest of menstruation is the consequence, while the inflammation extends through the whole substance of the uterus to the adjoining peritoneum. Peritonitis may also be the result of endometritis by extension of inflammation along the lining membrane of the Fallopian tubes. This is especially common as the consequence of gonorrhœa, whose frequency as a cause amongst all non-puerperal cases of pelvic peritonitis has been estimated as high as 50 per cent. Thus prostitutes almost invariably suffer, at some time, from this disease, which generally renders them permanently sterile. Amongst other causes of pelvic peritonitis are, replacement of the uterus by the sound, in some cases even the simple introduction of the sound, the use of an intrauterine stem pessary, applications to the interior of the uterus, and operations upon the body of the uterus. Peritonitis may also arise through septic absorption by the lymphatics, and thus may be the consequence of the use of tents, or operations upon the cervix or vagina ; but, in this case, the inflammation is more likely to become general.

From menstrual disturbances pelvic peritonitis may result,

not only through the medium of endometritis, but by direct reflux of blood through the Fallopian tubes, when the outlet of the uterus is obstructed in consequence of flexions or stenosis, especially if menorrhagia coexists. In the same way intrauterine injections may be an exciting cause. Escape of blood or other fluid from any other cause, as from rupture of a vein, of an over-congested Graafian follicle, or of a cyst in the Fallopian tube or ovary, may equally set up peritonitis. External violence, cold, or sexual excess act mainly through the medium of the inflammation which they may produce in uterus or ovaries. In puerperal cases the starting-point is usually an inflammation of the uterus or cellular tissue, due to a traumatic or septic cause, or a combination of the two. The peritonitis may, however, be kindled into activity by the effect of cold, of premature exertion, or of emotion. In other puerperal cases again, the peritonitis is part of a general peritonitis, due to some zymotic or other form of blood poison. Ovarian tumors frequently set up peritonitis ; fibroid tumors do so less frequently ; cancer or tubercle of the uterus or ovaries is sooner or later accompanied by such a result. A pelvic peritonitis may also be a part of a general peritonitis not originating near the uterus, and may then lead to the same results with respect to the pelvic viscera as the localized disease. Thus the signs of pelvic inflammation may attract attention in cases of tubercular or cancerous peritonitis.

Pathological Anatomy.—In the active stage of inflammation, plastic lymph is poured out on the surface of the peritoneum, and leads to adhesion between the pelvic viscera. In acute cases there is also an effusion of serous, of sero-purulent, or, in the septic forms of peritonitis, of purulent fluid. The semifluid lymph tends to gravitate into the pouch of Douglas, where it forms no tangible swelling, so long as it remains fluid and free, but is generally converted into a firm mass, fixing the uterus, as the lymph

consolidates. Within spaces formed by adhesion between coils of intestine, or between intestines and other viscera, serum may be poured out in considerable quantity, and a limited and rounded swelling may thus arise, which sometimes very closely simulates a true cyst (see p. 268). Suppuration may also take place in similarly limited spaces, though much less commonly than in the case of cellulitis. The pus thus collected may remain quiescent for a considerable time, and rarely escapes into the general peritoneal cavity. As a rule, the abscess perforates sooner or later, opening in most cases into the rectum or sigmoid flexure. Perforation into the vagina is less common, and that into the bladder is still more rare. Perforation on the external surface is also comparatively uncommon. When it does occur the most frequent site is the flexure of the groin. In some instances the abscess opens at more points than one. In the later stage of the affection the lymph becomes organized into bands of adhesion. As time goes on after subsidence of the inflammation, these are generally partially absorbed, and become lengthened and attenuated, especially in those situations where most motion naturally takes place. Some degree of distortion and fixation of the parts involved is, however, generally permanent in some situations, especially about the Fallopian tubes; hence sterility is a common sequel. The uterus is apt to be fixed, temporarily or permanently, in any abnormal position it may have had at the outset of the inflammation, and it is also liable to distortion gradually produced by traction, in consequence of the shrinking of plastic lymph.

Results and Symptoms.—In the more acute forms of pelvic peritonitis, the symptoms resemble those of general peritonitis, and differ only in the fact that the pain and tenderness are more or less localized in the lower part of the abdomen, and that the general symptoms are less intense in degree. Frequently there is a rigor at the com-

mencement, and pain may be severe at first, accompanied by extreme tenderness in the hypogastrium. The pulse becomes rapid, and acquires more or less of the peritonitic quality. There is often considerable rise of temperature, but its elevation is generally less in proportion than that of the pulse, and sometimes even a normal temperature exists in severe septic forms of inflammation, so that the temperature alone is an unsafe guide as to severity. Frequent micturition, with severe vesical tenesmus, is a common symptom. The bowels are generally constipated (except in septic and general forms of peritonitis), and there is much pain on defecation. The abdomen is frequently tympanitic, and it is not uncommon to find a transient tenderness over its whole surface, which may shortly subside, and leave only localized symptoms. Rigidity of the abdominal muscles over the region of tenderness is almost invariably present. In the more severe forms of inflammation, nausea and vomiting are common, and the features become pinched and anxious.

Cases, however, are not unfrequent in which the inflammation is chronic and almost latent from the first, especially when the exciting cause is some continuous, but not very intense, source of irritation, such as endometritis or ovaritis, or when the attack is a recurrence of some old-standing inflammation. This may happen even in the gonorrhœal form of the disease, although, under such circumstances, the attack is commonly more acute. In the chronic cases the symptoms are extremely insidious, and the patients may go about their occupations as usual, suffering only from a gradual increasing pain in hypogastric or inguinal regions. In some instances, the only complaint made is that of bladder irritation, although, on examination, the whole pelvis is found to be filled with inflammatory irritation. The pulse in these cases is usually found to be rapid, often from 100 to

120, although elevation of temperature may be slight or absent.

The sequelæ of the disease are of an extremely chronic kind, and those who have once suffered from it are generally liable to relapse on slight provocation, especially from the effect of cold, or imprudence at menstrual periods. In many cases the uterus eventually recovers its mobility, and almost all remnant of swelling in the pelvis disappears. When, however, the whole roof of the pelvis has become hardened into a board-like mass, and absorption does not take place within the first few months, this condition may remain a permanent one. Years may elapse before the utmost degree of relative cure which can be hoped for is attained, and patients may remain invalids for, at any rate, the remainder of the period of active sexual life. After an attack of peritonitis, the recurrence of menstruation is frequently deferred. The ensuing period is apt to rekindle inflammation, but if this does not happen, it is often followed by relief. Protracted, or even permanent amenorrhœa, or scanty menstruation, is, however, a frequent sequel. Dysmenorrhœa is also commonly produced from the interference with the functions and vascular supply of uterus and ovaries caused by the adhesions.

Diagnosis.—In the more acute forms of the affection, the symptoms readily show the existence of periuterine inflammation, and the chief point of difficulty is to determine whether peritonitis or cellulitis is the main element. Assistance may be derived from the consideration that, when there has been no antecedent parturition, abortion, or operation on the cervix, and when the exciting cause lies in the body of the uterus, ovaries, or Fallopian tubes, rather than in the cervix, especially if that cause be gonorrhœa, the inflammation is more likely to be peritonitic. In peritonitis, also, tenderness is more acute, and vomiting and other symptoms pertaining to the digestive functions are more

likely to be prominent than in cellulitis with little or no complication of peritonitis. In cellulitis, on the other hand, the initial rigor and elevation of temperature are more marked in proportion to the other symptoms.

On vaginal examination in the earliest stage, while the exudation is still fluid, merely tenderness and slight increase of resistance will be discovered around the cervix. The uterus will be very tender on pressure, and still more so on displacement. After consolidation of the exudation, one of two conditions may be found:

(1.) In the first, the inflammation, while limited to the pelvis, is general throughout that region. This constitutes the most typically recognizable form of pelvic peritonitis. The cervix uteri is then central, or slightly pushed forward, low down in the pelvis, and firmly fixed, not displaced to either side. Induration extends all round it, and forms a roof to the pelvis of uniform hardness. At the posterior part, where lymph gravitates into the pouch of Douglas, it descends somewhat lower, and forms a more distinct mass. The induration can be reached from above the pelvic brim, but does not form an apparent tumor rising into the abdomen, or extending into the iliac fossa, nor does it descend so low upon the vaginal walls as that formed by cellulitis sometimes does. On rectal examination, a hard mass can be felt enveloping the cervix posteriorly, and extending at the sides of the rectum to the pelvic wall, while its upper limit can generally be scarcely reached.

(2.) The second condition is that in which there is a localized focus of inflammation, which may extend or not above the pelvic brim. Portions of intestine, matted together by adhesions, and often containing impacted fæces, may then form an apparent tumor which may reach as high as the umbilicus. In this case the uterus may be pushed forwards, backwards, or to one side. If serum or pus be effused in a limited space, the tumor may be apparently cystic. The

mass thus formed by adhesions may generally be distinguished from the swelling formed by cellulitis by the following characters. In cellulitis the swelling, if of any considerable dimensions, is always on one side, tending toward the iliac fossa, rarely rises more than two or three inches above Poupart's ligament, and has a strong tendency to suppurate. In peritonitis the swelling is later in its appearance, and may be more nearly central, and rise to a higher level, while, if it is situated near the groin, the abdominal walls are more movable over it than over a swelling formed by cellulitis. Such a swelling may generally be distinguished from an ovarian or fibroid tumor by its fixity and by the history of its first appearance after the onset of acute inflammatory symptoms (see p. 268). If situated at the side, or in front of the uterus, it may be pressed downward by the effusion of serum in its midst, so that it may become difficult or impossible to distinguish it from cellulitis. As a rule, however, it does not descend so low upon the vaginal wall. From an early extrauterine foetation it is distinguished by the absence of the characteristic signs of that affection (see p. 270).

A peritonitis affecting the pelvis which forms a part of cancerous or tubercular peritonitis, or originates in perityphlitis, is distinguished by recognition of the signs of the primary disease. An induration produced by diffuse cancer of the pelvis may closely resemble that of pelvic peritonitis, and may be only distinguishable by the amount of cachexia present, and by the course of the case. The discovery of the slight increase of resistance or diminution of mobility of the uterus, which may be the sole remnant of a bygone pelvic peritonitis, often requires a highly practiced touch.

Treatment.—In the acute stage, when pain is severe, provided that the patient is not already too anæmic, from ten to twenty leeches may be applied to the groin or hypogastrium. Perfect rest is to be maintained, and hot linseed

poultices or fomentations kept applied to the abdomen. Sufficient opium or morphia should be given to keep the pain in check, and may conveniently be administered by the rectum or subcutaneously. Opinions differ widely as to the use of mercury. It appears to be of little value as an antiphlogistic in the early stages, but in severe cases, not of a septic or purulent character, it may be tried if the disease appears not to yield to other remedies, care being taken to keep short of salivation, and not to act upon the bowels. Three grains of hydrargyrum cum cretâ, with five grains of Dover's powder, may be given in pill or powder two or three times a day. It is frequently preferable, however, to use the mercury locally in the form of ointment, equal parts of mercurial ointment and belladonna ointment being applied on lint over the seat of inflammation. It is recommended by Dr. Thomas that all other drugs should be avoided, and opium or morphia given in large and repeated doses, frequently as much as half a grain of sulphate of morphia being administered every two or three hours for a considerable time. Milk and beef tea may be given as diet, ice being added to the former, if vomiting is urgent. Vomiting is often relieved in these cases by subcutaneous injection of morphia. The treatment of severe septic forms of inflammation has been considered under the head of metritis (see p. 163).

In less acute forms of pelvic peritonitis opium or morphia in smaller doses may be given at first in combination with salines, as citrate and nitrate of potash, or acetate of ammonia. In the later stage iodide of potassium, in doses of from five to ten grains, is useful as an absorbent, and may often, with advantage, be combined with quinine or other tonic. After all febrile symptoms have passed absorption is not promoted so effectually by the administration of any drugs as by securing the best possible condition of general health, and by all general means which tend to

promote the activity of processes of nutrition. Small doses of perchloride of mercury may, however, in some cases be tried. As the inflammation is subsiding repeated counter-irritation is of great value. Vesication by blistering fluid, over a surface about four inches square, may be repeated at intervals of about ten days, or a blister may be kept open by savine ointment. A milder remedy is the linimentum iodi, painted daily over the same surface, as long as the skin will tolerate it. Absorption is also stimulated by hot vaginal injections, used in the manner previously described see p. 175 . The heat should be moderate at first, and should be increased gradually up to 110° F. Hot hip-baths, or, still better, whole-baths, are also of value, and are efficacious to relieve pain. When the absorption of in-flammatory material does not proceed satisfactorily the use of salt water often proves efficacious, from its greater stim-ulating power.

When a case has reached the chronic stage, or is chronic from the commencement, complete confinement in bed is not advisable. Sufficient air and exercise to maintain the general health should be allowed, especially carriage exer-cise, if the motion can be borne without pain. A large amount of rest, however, should be taken in the horizontal position, and cold or exertion should be specially avoided at menstrual periods. Marital intercourse is to be forbidden in acute stages or while it produces pain, and should be greatly restricted for a long period. It is not, however, al-ways desirable to prohibit it entirely, especially if there is any ovarian engorgement or inflammation, such as often results from the hindrance to the function of the ovary pro-duced by adhesions. Recurrent pain, accompanied by ten-derness of the uterus, may be relieved by a few leeches applied occasionally to the cervix. At this stage tonic treatment, especially the administration of iron and qui-nine, is beneficial, and change of air, or a seaside residence,

often proves useful. If relapses are found to occur from the effect of cold, spending the winter in a warm climate is to be recommended.

It is not generally desirable to evacuate collections of pus or serum, unless manifest pointing has occurred. If, however, an abscess remains long in a stationary condition, and the general state of the patient is unsatisfactory, it may be evacuated by the aspirator. If pus again collects, a larger opening may be made, and the cavity washed out with a weak warm solution of iodine, sulphurous acid, or other antiseptic (see pp. 284, 285). If an abscess is pointing externally, it should be opened under carbolic spray. A drainage-tube and antiseptic injections will sometimes be useful in this case, if pus continue to form. Protracted suppuration is apt to occur from the irregularly indurated walls of the cavity refusing to close. Sometimes elastic pressure from a large pad of cotton-wool judiciously applied is of service to keep the cavity emptied.

PELVIC CELLULITIS, PERIUTERINE CELLULITIS, OR PARAMETRITIS.

Causation.—The chief causes of pelvic cellulitis are parturition, abortion, applications of caustic to, or operations on, the cervix uteri or vagina, inflammation of the uterus, especially the cervix uteri, and inflammation of the ovaries or Fallopian tubes. In a very large proportion of cases the cause is parturition, and the mode of origin may then be, in whole or in part, directly traumatic, from the pressure and bruising to which the cervix and cellular tissue are exposed, or from lacerations of the cervix. Thus puerperal cellulitis is much more common on the left side, on account of the usual direction of the occiput toward the left and the common deviation of the fundus uteri toward the right, both which causes tend to make the pressure greater

on the left side of the pelvis. In the majority, however, both of puerperal and non-puerperal cases, the main element is septic absorption from some cut or lacerated surface, or from an abrasion, such as may be produced by the use of tents. The determining cause of the acute outbreak of inflammation is often the effect of cold, mental emotion, or premature exertion after parturition, or after some operative interference. Cellulitis may result from menstrual disturbances, but much less frequently than peritonitis ; and when it does so, it is probably for the most part by extension of inflammation from the ovaries or Fallopian tubes into the adjoining tissue, while there is commonly a complication with a notable degree of peritonitis. Cellulitis may also be set up by sexual excess or external injuries, especially if any previous disease of the uterus or its appendages exist. A similar inflammation of cellular tissue again may take its origin from cancerous or syphilitic ulceration of rectum or vagina, or from disease of the bladder.

Pathological Anatomy.—Pelvic cellulitis is an inflammation or phlegmon of the areolar tissue in the pelvis, in the vicinity of the uterus or its appendages. This areolar tissue is most abundant in the broad ligaments. It also exists in plenty in front of the lower half of the uterus between it and the bladder, for a smaller space at the posterior part of the cervix (see Fig. 22), as well as around the vagina, bladder, and rectum, and in the sheaths of the psoas and iliacus muscles and the muscles of the abdominal wall. Between the uterus and its peritoneal covering at front and back areolar tissue is so scanty that cellulitis can scarcely occur there. The term " periuterine cellulitis " has been used in a sense limited to inflammation immediately adjoining the uterus at its sides, front, or back. An abscess after parturition, however, may appear at a distance from the uterus, as in the groin or abdominal wall, while no remnant of inflammation can be detected round the

uterus, and the wider term of "pelvic cellulitis" therefore appears preferable. Those cases, however, are to be distinguished in which inflammation merely extends into the pelvis from outside, as in a psoas abscess.

In the majority of cases, especially those of puerperal origin, the inflammation is chiefly situated in one or the other broad ligament, whence it tends to spread into the iliac fossa, and along the sheaths of the muscles to the groin and the adjoining portions of the abdominal wall. This form of cellulitis has been distinguished by the name of "*phlegmon of the broad ligament.*" In other cases, however, especially those arising from lesion of the cervix, the tissue in front of, or behind, the uterus may be chiefly or solely affected, and the inflammation may also descend along the walls of the vagina or rectum, or may occupy chiefly the tissue at the base of the bladder.

Since septic absorption is so generally an element in cellulitis, the lymphatic vessels play an important part in it, as in all inflammations of the cellular tissue. In some cases enlarged lymphatic glands in the pelvis may be detected as rounded masses in the midst of inflammatory thickening, and these may form foci of inflammation or abscess formation.

In the earlier stages of cellulitis a swelling is produced by effusion of serum or lymph into the areolar tissue. This may end in resolution, or in the formation of an abscess, which is a much more frequent result than in pelvic peritonitis. It is commonest in puerperal cases, and has been estimated by some authorities as occurring in more than 50 per cent. of these; but this is probably too high an average, if mild as well as severe cases be included. By far the most frequent spot for the abscess to open is the groin or iliac region. It may also open externally above the pubes, beside the anus, or, very rarely, pass through the sciatic or obturator foramen. Internally, discharge into the rectum

and that into the vagina are about equally common; that into the bladder is also frequent, but rather less so. Discharge into the peritoneal cavity is fortunately very rare. Internal evacuation is commoner in non-puerperal cases, in which the abscess is generally nearer to the uterus, or, in rare instances, may be situated between uterus and bladder. When an abscess resulting from parturition appears at a distance from the uterus, as in the groin, or near the sacro-iliac joint, and the vicinity of the uterus is found free, the explanation is probably for the most part that the inflammation has terminated in resolution near the uterus, and has proceeded to suppuration at a distant point only. In some cases, however, the distant abscess may be due to conveyance of septic material by lymphatics, without any perceptible intermediate inflammation.

Results and Symptoms.—The onset of the disease is acute in the great majority of cases, and a decided rigor and elevation of temperature (often reaching or exceeding 103° or 104°) more generally occur than in the case of pelvic peritonitis. The fever is accompanied or quickly followed by pain, which is not always very acute, and often depends in great measure upon implication of the peritoneum. Vesical tenesmus and pain on defecation are frequently added. If menstruation is present at the time of onset the flow may be increased, except in cases in which the inflammation is complicated by any considerable degree of acute endometritis or metritis, the effect of which is usually to arrest either the lochial or the menstrual discharge. In some puerperal cases the inflammation commences more gradually, and is only kindled into activity after the patient leaves her bed. More rarely the symptoms are limited to slight pelvic pain, and trouble in micturition, with feverishness and debility, and the exudation may only be discovered on examination at a considerable interval after delivery. More frequently a swelling appears

within a few days in the groin or iliac region, or extending to the hypogastrium. Flexion and adduction of the thigh, which are often enforced in consequence of the pressure of the exudation, are characteristic symptoms. In the course of a few weeks, in the majority of cases, the disease either ends in suppuration, or resolution has commenced. Thickening in the cellular tissue, however, is only slowly absorbed, and a certain amount of induration may be permanent. Lameness on the affected side is often slow in disappearing. The uterus may be drawn to one side by contraction of the inflamed tissue in a late stage; but complete fixation of the uterus, with sterility, and other permanent sequelæ, when they occur, are commonly due to associated peritonitis. Suppuration probably most frequently commences within a few days, when it takes place at all, but the period of bursting of the abscess commonly varies from two weeks to three months.

Thrombosis of the veins is a common result of inflammation in the cellular tissue surrounding them, and involves a risk of pulmonary embolism. This is one reason why protracted rest should be enforced after even a slight attack of cellulitis. If thrombosis extend to the iliac or femoral veins and lymphatics, phlegmasia dolens may be a sequel, especially in puerperal, but sometimes also in non-puerpural, cases. In some instances an abscess burrows extensively in the pelvic cellular tissue. Suppuration may then be protracted, especially if the abscess opens by a long fistulous track, or an opening exists in two directions simultaneously. The patient may thus be greatly reduced by hectic fever, and even a fatal result follow. In very rare cases there is extensive sloughing of areolar tissue. The mortality, however, of uncomplicated pelvic cellulitis is, in general, small, and much less than that of pelvic peritonitis.

Diagnosis.—In the typical case of pelvic cellulitis, namely, that of phlegmon of the broad ligament, in which the cellu-

lar tissue of the broad ligament is the chief focus of inflammation, the diagnosis is generally easy. On vaginal examination, a considerable and immovable swelling, shading off into the pelvic wall, is felt on one side of the cervix and rather low down. The cervix itself is pushed towards the opposite side, and its mobility, although diminished, is often not entirely destroyed. Some thickening may also extend round the front and back of the uterus. The later swelling can be reached by the external hand above the groin, and on bimanual examination is felt as a considerable mass between the fingers. Unless the extent of inflammation be very limited, it forms a swelling in the inguinal and iliac region, either prominent and readily tangible, or, at any rate, sufficient to give rise to a feeling of resistance, and partial or complete dulness on percussion. A cellulitic swelling, however, rarely extends higher than two or three inches above Poupart's ligament, or is liable to be mistaken for a tumor, except in the rare case of a large abscess between uterus and bladder, which may rise as high as half-way between pubes and umbilicus. For the differential diagnosis of a swelling in the abdomen due to peritonitis, see p. 302.

When cellulitis affects the tissue in front of, or behind, the uterus, the induration caused by it is very difficult to distinguish from that due to peritonitis, and it is often complicated by that affection. When, however, the induration extends low down upon the walls of vagina or rectum, or when it chiefly affects the base of the bladder, the diagnosis of cellulitis becomes positive. Diagnosis is often assisted by the fact of parturition, abortion, or some operation upon uterus or vagina having preceded.

From a fibroid or ovarian tumor, a cellulitic swelling is distinguished by its fixity, and by the fact that no sign of tumor had existed before the onset of inflammatory symptoms. For the differential diagnosis of extrauterine fœtation see p. 270, and for that of hæmatocele see p. 318.

Treatment.—The local and general treatment is similar to that of pelvic peritonitis (see p. 303). The use of leeches is, however, less frequently desirable, since the affection frequently occurs from a septic cause in anæmic patients or those debilitated by hæmorrhage. If used at all, they should only be employed quite at the onset. From the frequent presence of a septic element, quinine, or other internal antiseptic, in large doses, combined with opiates, is often given with advantage until the temperature is reduced.

It is not desirable to interfere at an early stage to evacuate pus. When, however, an abscess is commencing to point externally, so that fluctuation is distinct, and there is no fear of opening the peritoneal cavity in making the incision, it may be evacuated with advantage. It is desirable that this should be done under carbolic spray, and the wound dressed with antiseptic precautions. When the pointing takes place by vagina or rectum, artificial evacuation requires more caution, and is more frequently superfluous. If a distinctly fluctuating spot is felt, aspiration with a fine trocar may first be employed, and a larger opening afterwards made if necessary. In puncturing an abscess from the vagina, care should be taken to avoid any pulsating arteries which can be felt. In the absence of the aspirator, a grooved needle may be used to confirm the presence of pus, and afterwards serve as a guide for a guarded straight bistoury or tenotomy knife. A small puncture having been made, it may be enlarged by introducing a pair of dressing forceps, and separating the blades, according to the method recommended by Mr. Hilton for the evacuation of deep abscesses.

Some authorities, as Sir James Simpson, Dr. Savage, and Mr. Spencer Wells, recommend puncture as soon as the existence of an abscess is distinctly ascertained. When grave constitutional symptoms referable to an ab-

scess arise, it is certainly worth while to venture on puncture with an aspirator in the earlier stage. If the abscess fail to close for a long period, care should first be taken that its outlet is free, then injections of a weak solution of iodine or other antiseptic see pp. 284, 285, with the application of pressure, may be tried, while in obstinate cases, a second opening should be made, if necessary, at the most dependent point, and a drainage-tube employed, with frequent washing out of the cavity.

PELVIC HÆMATOCELE.

By pelvic or periuterine hæmatocele, in its wider sense, is understood a limited collection of blood wholly or partially in the pelvis, whether within the peritoneal cavity, or in the cellular tissue outside it. An effusion of blood while still free within the peritoneum should not receive the name of hæmatocele, though its causes may be the same, and though it may form an antecedent stage to that affection.

Causation.—The *immediate mechanism* of the production of hæmatocele may be, for the intraperitoneal variety : (1) Reflux of menstrual blood through the Fallopian tubes, due either to atresia or obstruction of the cervix or vagina, or to excessive menstruation ; (2) excessive hæmorrhage or rupture of a Graafian follicle ; (3) rupture of a vessel in the broad ligament or elsewhere ; (4) hæmorrhage from inflamed peritoneum, or from vascular pseudo-membranes ; (5) rupture of a cyst in the ovary or broad ligament ; (6) rupture of the distended Fallopian tube ; (7) rupture of the sac of an early extrauterine fœtation, or a fœtation in a rudimentary uterine cornu. Of these, the first four, which are generally the menstrual kinds of hæmatocele, form the least severe varieties, while in the fifth, sixth, or seventh, the hæmorrhage is more frequently excessive, and is apt to

prove fatal before the blood becomes encysted. In the extraperitoneal variety the mechanism is generally that of the rupture of a vessel, either into the surrounding tissue, or into a pre-existing cyst. This, like the first four varieties of the intraperitoneal effusion, is generally a menstrual form of hæmatocele.

The *predisposing causes* are the presence of menstruation ; active or passive hyperæmia of the uterus and adjoining parts, by whatever cause produced ; previous disease within the pelvis, especially obstruction of the cervix uteri or vagina ; the hæmorrhagic diathesis ; and diseased conditions of blood, such as those produced by zymotic diseases, jaundice, purpura, or scurvy.

The *exciting cause* is most frequently external violence ; muscular strain ; coitus, especially during menstruation ; or the effect of cold or mental emotion in producing a sudden increase of hyperæmia during the same condition.

Pathological Anatomy.—Pelvic hæmatocele is not excessively rare, but yet undoubted instances of it form a very small proportion to cases of pelvic cellulitis or peritonitis.

In the great majority of fatal cases in which an autopsy has been made, the effusion of blood has been reported as being intraperitoneal, although it has often proved extremely difficult to determine positively the true position of the peritoneum. It is probable, however, that the extraperitoneal variety is relatively much commoner among those cases which end in recovery. It is also probable that, in a considerable number of cases which are not distinguished from pelvic cellulitis or peritonitis, the starting-point of inflammation may have been a slight or moderate effusion of blood.

Blood effused into the peritoneal cavity tends to gravitate into the retro-uterine fossa, but does not form a tangible swelling there while it remains fluid. When clotting has taken place, there may be a mass to be felt behind the

cervix ; but the uterus will not be displaced more than it is when the lymph effused in pelvic peritonitis gravitates into the same position. An induration of this kind, but no more, may be formed by gravitation into the pelvis of

Fig. 61.
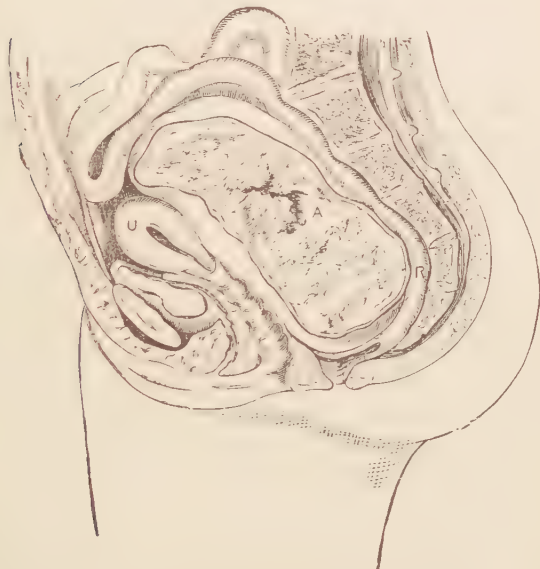
Retro-uterine Hæmatocele.—(After Barnes.) U. The uterus pushed forward. A. The hæmatocele filling the cavity of the sacrum, bounded above by plastic effusions and the small intestines. R. The rectum compressed by the hæmatocele.

blood effused, not within the pelvis itself, but elsewhere in the peritoneal cavity. When, however, the amount of blood effused is not sufficient to cause death, it is soon inclosed by false membranes, which separate it from the intestines which it has displaced from the retro-uterine fossa. If further hæmorrhage now take place within the inclosed space,

the uterus is pushed forward and upward, the rectum flattened against the sacrum, and a retro-uterine tumor formed, which may extend upwards as high as the umbilicus (Fig. 61). This condition, which constitutes the most typical and recognizable form of hæmatocele, and the one which specially deserves the name of retro-uterine hæmatocele, thus necessarily implies (unless it be of the extraperitoneal variety) either a slow and gradual hæmorrhage or one repeated at intervals.

An intraperitoneal hæmatocele situated in front of the uterus has occasionally been observed, but it is scarcely possible for it to be confined to that position, unless the retro-uterine fossa has previously been occluded by false membranes. The extraperitoneal variety of hæmatocele chiefly occurs in the broad ligaments, more rarely in the cellular tissue in front of the uterus. It is also possible for blood-effusion, like cellulitis, to occur in the cellular tissue behind the cervix. Retro-uterine hæmatocele, however, so far as a conclusion can be drawn from records of autopsies, appears to be almost invariably intraperitoneal.

A frequent and important variety of hæmatocele is that which arises from reflux of blood through the Fallopian tubes. This is especially likely to occur in cases of dysmenorrhœa with menorrhagia dependent upon obstruction of the cervix from stenosis or flexion. The Fallopian tubes are then often unduly patent, and may themselves abnormally pour out blood from their mucous membrane in menstruation. Under the influence of a sudden contraction of the uterus or of the tube itself, the outlet not being free, the blood escapes from the ostium abdominale of the tube. The same may occur even without obstruction to the outlet, if the flow of blood is very excessive. In cases of complete atresia of cervix or vagina, the Fallopian tubes eventually become distended by retained blood, which may escape by reflux, or, more frequently, by ulceration or rupture. The

rupture of the sac of a tubal fœtation at an early stage, often so early that no pregnancy has been suspected, is probably not a very uncommon cause of the more severe forms of hæmatocele. If, however, the fœtation is rather more advanced, so that a positive diagnosis has become possible, the amount of blood lost is usually sufficient to destroy life before it can become encysted. Virchow has maintained that the usual source of hæmorrhage is vascular peritoneal adhesions, and that therefore peritonitis is an almost invariable antecedent of hæmatocele. General experience does not lead to the conclusion that this is often the case; but instances have been recorded of hæmorrhage into a pseudo-cyst, formed by the adhesions of peritonitis (see p. 299).

Results and Symptoms.—In a marked case of hæmatocele, where the effusion of blood is considerable, a patient, generally during a period of profuse menstruation, and often from the effect of one of the exciting causes before mentioned, is suddenly attacked by pain, which is quickly followed by faintness, and often collapse, with nausea or vomiting. The loss of blood may be sufficient to produce pallor. Metrorrhagia generally continues in some measure, though it may be diminished in amount. In other cases, the onset of the attack takes place while menstruation is imminent, or after its suppression, or after partial or temporary suppression, from the effect of cold or emotion. After awhile, symptoms of pressure in the pelvis arise—a feeling as of the presence of a foreign body—with vesical and rectal tenesmus. A swelling may also appear in the hypogastrium, and extend upward toward the umbilicus. At first the temperature may be subnormal, but, within two or three days, a febrile reaction generally occurs, with symptoms of pelvic or general peritonitis, which may be of greater or less intensity. When, however, the hæmorrhage is slight or gradual, the onset of the attack may be little marked.

When the cause is a rupture of the sac of an extrauterine fœtation, the occurrence more frequently takes place apart from menstruation, and the signs of hæmorrhage are generally more severe.

A recurrence of hæmorrhage at succeeding menstrual periods is not unfrequent, and in this way the tumor may undergo repeated increase in size; otherwise it diminishes and becomes harder by absorption of the serum. Sometimes its contents again become softened in consequence of decomposition or suppuration, and constitutional symptoms of septicæmia may then supervene. In some cases spontaneous evacuation, before or after suppuration, takes place by rectum, or, more rarely, by vagina. In others the tumor becomes very slowly and gradually absorbed. In rare cases rupture into the general peritoneal cavity occurs. Death may occur from this cause, or from septicæmia or peritonitis; and the prognosis is always grave when the effusion is of enormous size or when decomposition takes place in it.

Diagnosis.—The diagnosis is easy in a typical case of retro-uterine hæmatocele, when the onset has been sudden and well-marked. On vaginal examination a large mass is then felt, pressing down the recto-vaginal septum by distension of the pouch of Douglas, and encroaching upon vagina and rectum. The cervix is displaced forwards, and generally upwards, much more considerably than in pelvic peritonitis or cellulitis. The fundus uteri is pushed forward against the abdominal wall, so as to be much more readily tangible than usual (see Fig. 61). On bimanual examination, a mass is felt behind, and generally above, the fundus uteri, continuous with that behind the cervix, and sometimes reaching as high as the umbilicus. Such a tumor may be recognized within two days of the first hæmorrhage. The mass is at first somewhat soft and yielding, but be-

comes gradually very hard and nodular, though it may afterwards again soften.

When the history is not clear, when the amount of effusion is moderate, or when the case is only seen at a late period, there may be much difficulty in distinguishing hæmatocele from other masses which may exist behind the uterus. Such masses may be formed by a retroflexed fundus uteri, pregnant or not, by pelvic peritonitis or cellulitis, fibroid tumors, ovarian tumors, parovarian cysts, hydatid cysts, dermoid tumors, extrauterine fœtation, a distended Fallopian tube, malignant disease, outgrowths from the pelvic wall, or fæcal accumulations. The distinction is most likely to be difficult between hæmatocele and cystic or dermoid tumors of the ovary, fibroid tumors, or extrauterine fœtation. The sudden appearance of the tumor of hæmatocele is its chief distinction. For the distinctive signs of extrauterine fœtation see p. 269. In estimating the value of enlargement of the uterus as a sign of this affection, it must be remembered that a uterus may be elongated when adherent to a hæmatocele. A retroflexed uterus will be distinguished by bimanual examination and the use of the sound if necessary.

When the hæmatocele is of small size, and does not descend low in the pelvis, or when it is situated laterally or anteriorly, especially if it is of the extraperitoneal variety, the diagnosis may be very difficult, and it may be impossible to distinguish it from pelvic peritonitis or cellulitis, except by means of exploratory puncture, a proceeding generally not to be recommended. In such cases a positive diagnosis is of little consequence as regards treatment. Sometimes the case is cleared up by spontaneous evacuation. In very rare cases an extraperitoneal hæmatocele has been closely attached to the uterus, and movable to some extent with it, thus simulating a fibroid tumor.

Treatment.—The question of immediate gastrotomy in

the case of rupture of the sac of an extrauterine fœtation will not be considered here, since it belongs rather to obstetrics. In cases where life does not appear to be immediately threatened by loss of blood, as soon as symptoms of the primary hæmorrhage are detected, perfect rest in the horizontal position, or with the pelvis somewhat raised, should be immediately secured, and ice may be applied over the hypogastrium. The best hæmostatic, and at the same time stimulant, is a hypodermic injection of morphia. Ergotin and gallic acid may also be given in the form of pill, or ergot may be administered subcutaneously (see p. 211), if the heart is not too feeble. Alcohol and ether should be absolutely avoided, unless there appears to be imminent risk of death from syncope.

When the febrile reaction occurs, the case should be treated like one of pelvic peritonitis (see p. 303), except that there will generally be no occasion for leeching. Special precautions should be taken at recurring menstrual periods, especially by the observance of absolute rest. When there is recurrence of pain and tenderness, it may sometimes be useful to apply leeches to the hypogastrium or groin. All early surgical interference in the way of puncture or evacuation of blood is undesirable, and is especially dangerous before there has been time for the effusion to be shut off completely by adhesion from the peritoneal cavity. There is also risk that fresh hæmorrhage may occur if the blood is drawn off early. At a later stage, however, if suppuration or softening has occurred, and symptoms of septicæmic fever appear, the hæmatocele should be evacuated. A free opening should be made, by the vagina if possible, and clots should be cleared out so far as they can be reached by the finger. The safest way to avoid hæmorrhage in making the opening is to use the galvanic or benzoline cautery. It will generally be desirable to wash out the cavity repeatedly with disinfectants,

and a drainage-tube may sometimes be useful. If diminu-
tion of the tumor be taking place, however slowly, inter-
ference should be avoided. In general, apart from decom-
position or suppuration, the contents should be evacuated
only when the tumor is of such enormous size as to cause
great inconvenience by pressure, and shows no tendency to
become absorbed. If spontaneous perforation take place,
the evacuation may generally be left to nature.

CHAPTER XI.

DISEASES OF THE VAGINA AND VULVA.

VAGINITIS.

INFLAMMATION of the mucous membrane of the vagina is called vaginitis, or with stricter etymological propriety " colpitis."

Causation.—Acute catarrhal inflammation of the vagina most frequently arises from gonorrhœal contagion. Vaginitis may also be produced by cold, sexual excess, parturition, the presence of a pessary or other traumatic cause, too hot or too cold injections, the irritation of acrid uterine discharges, or may arise in the course of zymotic diseases, as measles or scarlatina. It is promoted by want of cleanliness. Occasionally a simple vaginitis, produced by one of these causes, is so severe as to be indistinguishable from the specific form, and it may then resemble it in its power of carrying contagion to the other sex, or exciting purulent ophthalmia, if any of the secretion comes in contact with the eye. Chronic catarrh is most frequently the sequel of more acute inflammation, or the result of irritating uterine leucorrhœa. It may also arise from any of the causes already mentioned, acting in a less acute degree, and is especially liable to exist in debilitated women, or those of strumous, gouty, or rheumatic diathesis.

Pathological Anatomy.—At the onset of acute catarrhal inflammation, the mucous membrane is swollen and congested, and its secretion diminished. After a day or two, the secretion is increased, and becomes purulent or sero-

purulent. There is then great injection of the mucous membrane, especially upon the summit of its folds; and small ecchymoses may be formed in its substance, or superficial abrasions upon its surface. The gonorrhœal form of vaginitis is more frequently limited to the lower portion of the canal, and is more apt to extend to the urethra and vulvo-vaginal glands. In chronic catarrh, the secretion contains a large quantity of epithelial cells, with a variable proportion of mucous and pus-corpuscles. When there is any admixture of pus, the "trichomonas vaginalis," an infusorium possessed of one long cilium, is generally present. From long-continued catarrh, the vaginal walls become relaxed and the mucous membrane thickened. The term "*granular vaginitis*" is given to a chronic form of inflammation, in which the mucous membrane feels rough to the finger from the existence of numerous minute elevations. These are more frequently due to hypertrophy of papillæ than to enlargement of mucous follicles, since mucous glands are so scarce in the vagina that many observers have failed to find any. As to their existence, however, positive testimony ought to outweigh negative. In both acute and chronic vaginitis, the vulva commonly takes part in the inflammation.

In some cases of very severe inflammation of the mucous membrane, as those produced by pessaries or other foreign bodies, by highly acrid discharges, by exposure and violent friction in consequence of prolapse, or more especially in septicæmic conditions following any lesion, the epithelium may be thrown off, and adherent diphtheroid exudations may be formed upon the surface. Adhesion of the vaginal walls or cicatricial contraction is then apt to follow. The vagina may also be affected by true diphtheria.

Results and Symptoms.—In acute catarrh, there may be some febrile disturbance. Burning, aching, and throbbing are felt in the vagina. After the first day or two, the dis-

charge is profuse, and yellow or greenish. Often it is offensive, and by its acrid quality excoriates the vulva and surrounding parts. Generally there is vesical tenesmus, and smarting on micturition. The vulva and vagina are very tender, so that even the careful introduction of a single finger produces much pain. In the chronic form, there may be the same symptoms in milder degree, or the presence of discharge may be the only one noticed.

Diagnosis.—The degree of inflammation of the mucous membrane is best judged of by inspection with the aid of the speculum, or without it, if there is so much tenderness as to render its introduction painful. The speculum will also show how much of the discharge is coming from the cervix. If necessary, microscopic examination will distinguish the epithelial cells, or epithelial cells mixed with pus, of the vaginal discharge from the mucoid or muco-purulent secretion of the uterus. The chief difficulty in diagnosis is to distinguish gonorrhœal from simple inflammation. The chief characters of gonorrhœa are its sudden onset; the markedly yellow or greenish color, offensive smell, and irritating quality of the discharge; the smarting on micturition produced by extension of inflammation to the urethra; the occurrence of inflammation or abscess in the vulvo-vaginal glands, the ducts of which often become distinguishable as injected points just in front of the hymen or its remnant; and the communication of contagion to the male. The occurrence of marked œdema of the vulva, buboes, or consequent peritonitis, furnish still stronger evidence of gonorrhœa. A conclusion based upon all these signs, or the majority of them, would be right in ninety-nine cases out of a hundred; but, since a simple vaginitis may possibly have the same characters, it is never safe to pronounce an absolute affirmative opinion as to origin from gonorrhœal contagion. On the other hand, a chronic or recurrent gonorrhœa often presents no sign, except its contagious quality,

by which it can be distinguished from an ordinary form of simple inflammation.

Treatment.—In the very acute stage, warm hip-baths, and injections with emollient and sedative fluids, as decoction of poppies, or a weak decoction of linseed or starch, with the addition of a drachm of laudanum to the pint, should be used, the patient being placed in the dorsal position for the injections. Complete rest in bed also affords relief. A little later a warm solution of borax (ʒj ad Oj), or the liquor plumbi subacetatis dilutus may be used. After subsidence of the more acute symptoms, the injections may be made more astringent by alum, tannic acid, or sulphate of zinc (ʒj–ij ad Oj). A lotion containing forty grains of carbolic acid and the same quantity of sulphate of zinc, or forty to sixty grains of sulpho-carbolate of zinc to the pint, is also very useful, especially in gonorrhœal forms of inflammation. Of these injections the tannic acid and lead lotions have the disadvantage of often staining linen indelibly. For the mode of administering injections effectually, see p. 175.

In the acute stage laxatives and salines, especially the citrate or acetate of potash, should be given. With these may be combined drachm doses of tincture of hyoscyamus in camphor water, or infusion of uva ursi, if there is any urethral or bladder inflammation. Alcohol and spices must be absolutely avoided. If the inflammation is becoming chronic, or injections fail to relieve it, a tampon of cotton-wool, large enough to keep the vaginal walls separate, and soaked in glycerin, containing acetate of lead, sulphate of zinc, or tannic acid (gr. xx–lx ad ʒj), may be introduced from time to time, and left from twenty-four to forty-eight hours. Suppositories containing the same drugs are also useful (see p. 176). In the intervals, warm water injections should be freely used to wash away secretions, and warm water should also be employed before using the medicated lotions. It is also useful to apply occasionally to the whole vaginal walls a

solution of nitrate of silver containing ten or twenty grains to the ounce, or, in more obstinate cases, to apply at longer intervals one containing from thirty to sixty grains to the ounce. The most convenient mode of doing this is to pour the solution into Fergusson's speculum, while the patient is in the dorsal position. By altering the direction of the speculum, and finally withdrawing it very slowly, the liquid is brought into contact with every part. Meantime any cause of hyperæmia which tends to promote excessive secretion should be removed as far as possible. In debilitated or anæmic patients, tonic remedies, and especially iron, should be given.

MALFORMATIONS, DISPLACEMENTS, AND ATRESIA OF THE VAGINA have been considered in connection with the corresponding conditions of the uterus.

CICATRICES OF THE VAGINA, producing contractions or partial atresia, are generally the result of injury in labor, sloughing after parturition, or the incautious use of caustics. If they cause great inconvenience superficial incisions should be made in them, followed by dilatation. The vagina should be plugged for a few hours immediately after the incisions, or, if possible, a Sims's dilator of glass (Fig. 63) should be at once introduced. Care should be taken to use frequent antiseptic injections and to keep the patient in bed for a few days. To prevent the tendency to subsequent contraction, a Hodge's pessary may often be used with effect, if the cicatrices affect the posterior cul-de-sac, or upper part of the canal. If the upper part is free, and the lower part only contracted, a Sims's dilator of vulcanite may be substituted for that of glass, after the incisions have healed, and worn daily for at least some hours.

FIBROUS OR SARCOMATOUS GROWTHS occur in rare cases in the vaginal walls, or assume the form of polypi. In the latter case they may easily be removed by the écraseur.

VAGINAL CYSTS are also occasionally found. They

generally contain a clear, glairy fluid, and, in most cases, are formed by dilatation of the mucous glands which exist very sparingly in the vaginal walls. If they cause inconvenience they should be freely incised, and tincture of iodine applied to the cavity.

PRIMARY CANCER OF THE VAGINA is very much more rare than that of the cervix uteri or vulva. It may have the form either of carcinoma or epithelioma. The former sometimes appears in an infiltrating form in old women, commencing most commonly at the anterior vaginal wall, and producing contraction of the canal, with induration of its walls. Epithelioma may occur in comparatively young women, and more frequently commences in the posterior vaginal wall. The symptoms are similar to those of cancer of the cervix, but hæmorrhage is not usually so considerable. In infiltrating carcinoma difficulty in micturition and lancinating pain may be the chief symptoms. In epithelioma, or ulcerating forms of carcinoma, the first symptom is frequently pain and hæmorrhage on coitus. In an early stage, the disease may possibly be confounded with syphilitic ulceration. Cancer is distinguished by its friable surface, with hard base and edges, by its greater proneness to bleed on touching, and also by its resisting syphilitic remedies.

Treatment.—Epithelioma in the early stage should be removed, if possible, by the knife or the galvanic or benzoline cautery, or it may be excised with the knife or scissors, and the cautery applied afterwards. In general, however, the disease rapidly spreads in the loose cellular tissue beneath the vaginal wall, and extirpation becomes impossible. In the more advanced stage, if there is much hæmorrhage or fetid discharge, some relief may be afforded by the use of the sharp spoons, cautery, or caustics, in the mode described under the head of Cancer of the Cervix Uteri (see p. 230).

CYSTIC DILATATION OF THE URETHRA occasionally forms a swelling, projecting from the anterior vaginal wall, which causes inconvenience mechanically, and may even project at the vulva. The urine retained in the pouch also becomes irritating from decomposition, and is liable to be discharged involuntarily from time to time. The best *treatment* is to dissect off a portion of vaginal mucous membrane over the pouch, and bring the edges together by sutures of silk-worm gut, or silver wire. Sometimes the pouch attains a considerable size, and may involve a portion of the base of the bladder. The only radical cure in this case is to excise a portion of the wall of the pouch completely, and immediately close by sutures the urethro-vaginal or vesico-urethro-vaginal fistula so produced.

VULVITIS.—Catarrhal inflammation of the vulva, gonorrhœal or simple, is commonly associated with a similar inflammation of the vagina, and has been already considered in connection with vaginitis. When the vulvitis forms the prominent part of the affection, it is useful, except at the very acutest stage of the inflammation, to keep a sedative and astringent lotion in constant contact with the inflamed parts by means of a dossil of lint placed between the labia.* The vulva may also be painted with a weak solution of nitrate of silver (gr. x ad ℥j) every other day ; or, in obstinate cases, with a stronger solution (gr. xl–lx ad ℥j) at longer intervals.

Either after subsidence of vaginal gonorrhœa or other forms of acute vaginitis, as a sequel of marriage, or, occasionally, even in virgins, a very chronic and obstinate inflammation of the vulva may exist, generally most acute at its posterior part, affecting especially the hymen or its remnant, and extending to the fourchette. It may be associated

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* The following is a useful formula : Ext. Opii, gr. iv ; Glycerini, ʒj ; Liq. Plumb. Subacet. dilut. ad ℥j.

with superficial excoriations or fissures, and is the condition which most commonly gives rise to the symptoms of vaginismus (see p. 354). In its treatment, care should first be taken to cure any irritating uterine or vaginal discharge. When this has been done, the weak solution of nitrate of silver applied frequently to the vulva, as already described, is often effectual, but, if milder means fail, the mucous membrane may be brushed over with equal parts of strong carbolic acid and glycerin. Dr. Matthews Duncan describes, as one cause of vaginismus, a form of obstinate and recurrent superficial excoriation, which he regards as analogous to lupus, finding it occasionally to be associated with small tubercles. This he finds to be curable only by application of the actual cautery, or strong caustics, such as nitric acid. In chronic vulvitis, constitutional treatment, especially by saline purgatives, abstinence from alcohol, and a somewhat sparing diet, is of much importance. This is so especially in the case of gouty subjects, who are liable to an obstinate form of the complaint.

The form of purulent catarrh common in weakly or strumous children, which sometimes gives rise to a suspicion of contagion, is usually confined to the vulva. It is often promoted by uncleanliness or the irritation of threadworms. It should be treated by frequent ablutions, and mild astringent lotions, or an ointment containing acetate of lead. At the same time, good diet and tonics, especially cod-liver oil and iron, should be given.

FOLLICULAR VULVITIS is a chronic form of inflammation, in which either the mucous or sebaceous glands of the vulva may be inflamed and enlarged. In the former case, the internal surface of the nymphæ and vestibule are chiefly affected; in the latter, the enlarged follicles are seen most on the external surface of the nymphæ and internal surface of the labia majora, and the parts may be covered with an offensive cheesy secretion. This affection may be the cause

of severe pruritus or vaginismus. The *treatment*, local and constitutional, is similar to that of chronic catarrhal vulvitis. An ointment, made with vaseline, and containing acetate of lead (gr. x–xxx ad ℥j), to which hydrocyanic acid or morphia may be added, is often useful.

GANGRENE OF THE VULVA occurs in cachectic children in the form of noma, and also occasionally appears in some forms of puerperal septicæmia, or in severe zymotic diseases.

CYSTIC DILATATION OF THE VULVO-VAGINAL GLANDS arises from occlusion of the duct of the gland (the opening of which is situated just in front of the hymen), and is generally the consequence of vulvitis. A fluctuating swelling is thus formed, which may enlarge to the size of a small hen's egg, and distend the labium majus. It contains a clear glairy fluid. The chief symptom is usually that of pain or inconvenience on coitus. The *treatment* is to incise the cyst freely, and plug it with lint soaked in tincture of iodine, or the strong solution of perchloride of iron. If the swelling recurs, the cyst may be dissected out. Cysts at the vulva may occasionally also be formed by obstruction of an ordinary mucous gland.

INFLAMMATION AND ABSCESS OF THE VULVO-VAGINAL GLAND is commonly a sequel of gonorrhœa, but may arise from simple vulvitis, especially when combined with want of cleanliness. The *treatment* consists in rest, the application of poultices, and free incision from the mucous surface as soon as fluctuation is discovered. Inflammation and suppuration may also extend from the gland to the areolar tissue of the labium majus, or arise there from the direct effect of violence.

VARICOSE DILATATION OF THE VEINS OF THE VULVA is generally the result of pregnancy, but may occur apart from that condition, or persist afterwards. The *treatment* should generally be limited to bathing with cold water, administration of laxatives, and rest. Fatal hæmorrhage may

occur from puncture of these veins by a sharp instrument, or rupture by a blow or kick. Rupture has even occurred in coitus, or in straining at stool. If the hæmorrhage is detected, it may always be arrested by pressure.

HÆMATOMA, OR THROMBUS OF THE LABIUM is chiefly of importance in relation to pregnancy and parturition, but may result from violence or puncture by a pointed instrument even in the non-pregnant condition. In non-puerperal cases it is rarely necessary to evacuate the swelling. This should not be done unless decomposition or suppuration occurs in it, or its size is so enormous that no progress is made in its absorption.

ERUPTIONS.—Of the eruptions which may occur about the vulva, as elsewhere, the most frequent are lichen, acne, furuncles, and especially *eczema*. Eczema of the vulva is often the source of extreme distress from the soreness or pruritus which it occasions. It usually commences on the outer surface of the labia majora, and extends to the adjoining skin of the thighs and abdomen, as well as to the mucous membrane of the vulva. When chronic, it causes loss of hair, and considerable thickening of the skin and mucous membrane. The point chiefly to be noted about eczema in this situation is its frequent association with the presence of sugar in the urine, often without any loss of flesh or general symptoms of diabetes sufficient to attract attention. The eruption is not solely due to local irritation from the urine, since, as Dr. Braxton Hicks has pointed out, eczema not unfrequently occurs in other parts of the body in the same cases. Eczema also occurs from the irritation of a leucorrhœal discharge, from incontinence of urine in gouty subjects, or from the excoriation consequent upon excess of fat.

When the urine is saccharine, constitutional *treatment* suitable to diabetes should be employed, and the genitals should be washed with water after micturition. The local

and constitutional treatment is otherwise similar to that of eczema in other parts. In obstinate cases it may be necessary to modify the condition of the skin by brushing over it caustic fluids, as a solution of nitrate of silver (℥j ad ℥j), strong carbolic acid, or a solution of caustic potash (℥ss. ad ℥j), or by rubbing over it the solid nitrate of silver.

VASCULAR CARUNCLE OF THE URETHRA is a growth of connective tissue, springing from just within the orifice of the urethra, generally at its lower or lateral border. Its size may be from that of a pin's head up to that of a hazel-nut, or more rarely that of a cherry, and it is frequently pedunculated. In most cases the growth is very abundantly supplied with vessels and nerves, covered by an extremely thin epithelium, so that it is excessively sensitive and readily bleeds. It is sometimes single, but not infrequently there are a number of small growths extending some distance within the urethral orifice. The more sensitive variety of caruncle has a bright cherry-red color, and the tendency to bleed is generally in proportion to the sensitiveness. It is generally so friable that it can scarcely be grasped by forceps. The less sensitive variety of caruncle may be in color like the surrounding mucous membrane, and is less friable.

The *causation* is obscure, but the growth may sometimes originate in inflammation of the vulva and urethra; any cause of passive hyperæmia also tends to promote it. It is more common in married women, but is found not very infrequently even in young virgins, and is not rare in the old. The *symptoms* are generally pain on micturition, which is often extreme, and excessive tenderness to any sort of contact, so that coitus is generally impossible or very painful, and even walking may give distress. Hence it is always desirable to examine visually the orifice of the urethra when great hyperæsthesia at the vulval outlet is found on digital examination. Sometimes bleeding occurs in micturition or

at other times. Frequently severe hysterical symptoms are the result of the affection, and the mind sometimes becomes affected by serious depression. The *treatment* is to administer an anæsthetic, and if the growth is pedunculated, to snip it off with scissors, and apply to its base nitric acid, the solid nitrate of silver, or, what is preferable, the actual or benzoline cautery. Lead lotion, with the addition of opium or morphia, may afterwards be applied. If the growths are sessile, they should be destroyed by cautery. When they extend up the urethra, Mr. Bryant's urethral speculum dilator of ivory (Fig. 62) may be used with great

Fig. 62.

Bryant's Urethral Speculum Dilator.

advantage, both to expose them and to allow convenient access. The use of the cautery appears to be the most effectual means of guarding against recurrence of the caruncle, to which there is a strong tendency.

Granular inflammation of the urethral outlet, or extending some distance up the urethral canal, sometimes persists after removal of a caruncle, or may exist independently of any caruncle, especially in old women. The surface is then intensely red, may have the same extreme sensitiveness as a caruncle, and often readily bleeds. This condition may be treated by the application, with the aid of Playfair's probe (Fig. 51), of equal parts of carbolic acid and glycerin, or a strong solution of nitrate of silver (gr. xl–lx ad ℥j), or by the repeated application of the undiluted liquor plumbi subacetatis at intervals of two or three days.

HYPERPLASIA OF THE CLITORIS is generally in whole or in part congenital. The hypertrophy is usually unconnected with masturbation. If much inconvenience is caused

amputation of the organ may be called for, and is most conveniently performed by means of the galvanic écraseur.

HYPERPLASIA OF THE NYMPHÆ.—The nymphæ may be elongated into long flaps, either congenitally, or from the effect of masturbation. They may then form an impediment in coitus, or may become irritated from the contact of the clothes in walking. If necessary, they may be partially or wholly removed.

ELEPHANTIASIS OF THE VULVA is very rare except in Eastern countries. It generally commences in one labium majus, and may form an enormous pedunculated tumor. If the growth is pedunculated or localized, it may either be excised and its vessels tied or twisted, or it may be amputated by the galvanic écraseur, or by the knife of the benzoline cautery. Syphilitic hypertrophy of the vulva may take a form approximating to elephantiasis, or a syphilitic taint may predispose to the latter affection.

FIBROID OR SARCOMATOUS TUMORS in rare cases have their origin in the labia.

CANCER OF THE VULVA is not unfrequent, especially at the clitoris and margin of the labia. It generally commences in the form of epithelioma. At an early stage it may be *treated* by free excision in the same way as cancer of the vagina, and with more hopefulness. An ulceration due to tertiary syphilis may, in some instances, somewhat resemble cancer. In a doubtful case it will be distinguished by its yielding to syphilitic remedies. The so-called *rodent ulcer* in this situation is probably a superficial form of epithelioma.

LUPUS may occur on the mons veneris, on the cutaneous surface of the labia, or on their mucous surface, and, in the last case, it may extend to the vagina. It more frequently appears before the age of thirty, and is characterized by a superficial ulceration, sometimes accompanied by tubercular

elevations, which spreads in one direction while it heals in another. Its course may be one of many years. When it affects the mucous surface it is apt to be accompanied by hypertrophy and induration, with contraction of surrounding tissue. It may be *treated* by local applications of the cautery or of nitric acid, and by the same constitutional remedies as lupus elsewhere.

CHAPTER XII.

FUNCTIONAL AND SYMPTOMATIC DISORDERS.

AMENORRHŒA.

AMENORRHŒA, or the absence of the menstrual flow, within the limits of age during which it should naturally continue, is to be distinguished from occlusion of the genital canal, and consequent retention of menstrual fluid, which gives rise to an apparent, only, and not a real, amenorrhœa. Amenorrhœa, besides being a natural physiological condition in pregnancy and lactation, is a result common to a large number of constitutional and local pathological conditions. It has already been mentioned as a symptom of absence or imperfect development of uterus and ovaries, and of cystic or other form of degeneration affecting both ovaries, also as a sequel of severe inflammation of the pelvic organs, especially of acute ovaritis or pelvic peritonitis. The chief varieties are *primary amenorrhœa*, in which menstruation has never appeared at all, and *secondary amenorrhœa*, or suppression of menstruation.

The age at which menstruation commences may vary in different persons by a considerable number of years without calling for any special medical interference; but the longer its onset is deferred beyond the normal age the more likely is constitutional disturbance to attend the change. The difference depends partly on the general vigor and development of the whole body, partly on the relative development and activity of ovaries and uterus. Thus, in girls of deficient intellect puberty is commonly much retarded.

The occurrence of any serious illness within a few years before the natural date for the commencement of menstruation, often has the effect of considerably deferring its appearance. Primary amenorrhœa may be due to absence or imperfect development of uterus and ovaries, and imperfect development of either or both organs strongly predisposes to the production of secondary amenorrhœa, or a premature menopause, by comparatively slight causes. Sudden suppression of menstruation during the period of flow may be produced by cold, or by mental emotions, even when the suppression is not a symptom of actual inflammation; and this may be the starting-point of secondary amenorrhœa of considerable duration. Long-protracted and even permanent amenorrhœa may be the sequel of acute diseases or strong depressing emotions, or the menopause may come on prematurely without obvious cause. Sometimes superinvolution of the uterus after labor is the starting-point. Towards the natural period of cessation it is common for considerable periods of amenorrhœa to alternate with an occasional and sometimes excessive flow. Any chronic and wasting disease, and more especially phthisis, may induce primary or secondary amenorrhœa, according to the age at which it makes its appearance. Again, amenorrhœa may be produced by repeated loss of blood, as from hæmorrhoidal tumors. The same effect may result from a simple anæmia and failure of nutrition, due to insufficient diet, indigestion, or a too sedentary life. A sudden change in the mode of life, such as often occurs in the case of girls on going to school, is especially likely to interrupt menstruation when combined with any other of the above-mentioned causes. Amenorrhœa also sometimes comes on shortly after marriage, even without any pregnancy, and this is still more likely to occur after illicit intercourse, when there is a strong reason to dread the possibility of pregnancy.

Among all the causes of amenorrhœa there is none more

frequent or more important than *chlorosis*, the relation of which to menstruation is a somewhat complex one. The important significance of this relation is shown by the fact that the disease is almost limited to the female sex, and to an age not far removed from that of puberty. Chlorosis is a disease largely dependent upon congenital predisposition, and frequently associated with imperfect development of the heart, and narrowness of large arteries. It has, also, a close relation to the nervous system, for it is often characterized by the symptoms of nervous depression or irritability, and frequently owes its origin to a powerful depressing emotion, such as disappointment in love, or bereavement. As regards the condition of the blood, chlorosis differs from other forms of anæmia chiefly in the fact that the deficiency in hæmoglobin is far more than proportionate to the deficiency in number of the red corpuscles. This circumstance accounts for the extreme degree of the pallor of the skin and its greenish tint.

Chlorosis may come on before the age of puberty, and give rise to primary amenorrhœa. In other cases, the commencement of menstruation is the starting-point of chlorosis, the extra demand which thus arises having proved too much for the feeble powers of the system. In more rare instances, the same effect is produced by a menstruation which in the first instance was excessive, although it becomes scanty, or is entirely interrupted, after the chlorosis is established. In general, therefore, the amenorrhœa of chlorosis is secondary to the condition of the system generally, and that of the blood. It is probable, however, that in many, if not in most cases, the deficiency of the stimulus to nutrition furnished by ovarian development and activity contributes to the disease. Thus the tendency to the production of fat at the expense of muscular tissue, so often characteristic of ovarian torpidity, is frequently observed in chlorosis. Again, cases are not very unfrequent in which the amenorrhœa

appears to be primary, and to be associated at first with plethora, while anæmia and the signs of chlorosis only come on after an interval. The same inference may be drawn from the cases of chlorosis in which benefit is derived from marriage, or from direct emmenagogue treatment.

Contrasted with cases of chlorosis are those in which primary or secondary amenorrhœa is associated with an appearance of plethora and symptoms of general disturbance similar to those which frequently attend the menopause, such as headache, flushing of the face, constipation, hepatic derangement, and a tendency to morbid nervous and mental conditions. Ovarian inactivity may then generally be inferred, and this may be due either to a congenital condition, or to a sedentary life, with too good living. To these symptoms may be added hæmorrhages from various parts, as the lungs, stomach, nose, or rectum, or even sometimes from a wound or ulcer. These are sometimes spoken of as vicarious menstruation. It is very rarely, however, that the vicarious hæmorrhages have any monthly periodicity, but they indicate an excess of vascular pressure which does not find its natural relief.

Diagnosis.—In primary amenorrhœa it is desirable to make a local examination, if periodical pain, or any other symptom, suggest the suspicion that atresia may exist; if the appearance of menstruation is delayed many years beyond the normal time; if signs of general or local plethora coexist with amenorrhœa; or if marriage is projected. In secondary amenorrhœa special care must be taken to decide the question as to the possibility of pregnancy. If, in a healthy-looking young woman, menstruation, having been previously normal, has ceased suddenly without the occurrence of any illness, pregnancy is naturally the first cause which suggests itself. Special care should also be taken to seek for signs of any bygone inflammation of the uterus or surrounding parts, especially in the form of pelvic peritonitis.

Chlorosis is generally manifest in a patient's face. Even in the slighter degrees of anæmia, there are usually characteristic symptoms in the shortness of breath, debility, neuralgic pains, or indigestion, while anæmic murmurs are often to be heard over the heart and large arteries. If there is no manifest chlorosis, or other sufficient cause, signs of phthisis or other constitutional disease should be carefully searched for. The diagnosis of the conditions of uterus and ovaries associated with amenorrhœa has already been considered (see pp. 49, 242).

Treatment.—If amenorrhœa is a symptom of any constitutional disease, such as phthisis, the treatment should be directed solely to the primary disease; and, if it is the sequel of pelvic inflammation, the inflammation must be treated in the first place. In all forms of anæmia, but especially in chlorosis, iron is the great remedy, and in chlorosis it should be given in large doses. It is necessary, however, in the first place, to see that the digestive organs are in a condition to bear and to assimilate the iron, and it is often desirable to give first vegetable bitters with salines, or combined with acids or alkalies, according to circumstances. Dr. Barnes recommends iodide of potassium as preparatory to or in combination with the iron. If digestion is weak, the iron should be given in the most easily assimilable form, as the liquor ferri dialysatus, the ferrum redactum, or one of the vegetable salts. It is often of use to combine it with aloes, especially if any tendency to constipation exists. The aloes and iron may be given in pill, or the decoctum aloes co. may be combined in a mixture with the ferri et ammoniæ citras. Other tonic medicines, as quinine, strychnia, and especially arsenic, also sometimes prove useful. Cod-liver oil is beneficial, except in cases where there is a tendency to corpulence. Hygienic treatment is still more important than medicinal. It should comprise nourishing diet, especially an ample allowance of fresh meat, abundance

of fresh air and exercise, the most effectual form of which is riding on horseback, cold fresh, or, still better, salt-water baths, and change of air and scene. A stay at the seaside or watering-place with chalybeate springs is especially useful.

If menstruation is arrested by cold or any other cause in the midst of a period, without the occurrence of actual inflammation, an attempt should be made to restore it by the use of hot hip-baths or foot-baths, with the addition of mustard, by hot applications to the hypogastrium, and the administration of acetate of ammonia with ether, or (with caution and moderation) of the domestic remedy of gin in hot water. Similar treatment should be repeated at ensuing periods, if menstruation does not come on normally. In all cases of amenorrhœa not dependent upon anæmia a similar mode of stimulation may be employed for three or four consecutive days in several succeeding months, either at the period of menstrual nisus, if that is revealed by any sign, or at intervals of about four weeks. The hip-bath may be taken at night, followed by a hot linseed or bran poultice to the hypogastrium, and the hot foot-bath with mustard may be used in the morning, while a pill of aloes and myrrh is taken every night. Stimulating liniments may be used to the breasts and inner surfaces of the thighs; and hot vaginal injections or enemata may also be tried. It is often of use also to apply about the same time from four to six leeches to the labia, or three or four to the cervix uteri. This measure tends to induce a periodical fluxion towards the pelvic region, and is especially indicated in primary amenorrhœa, or when vicarious hæmorrhage has occurred. In the intervals, a rubefacient or occasional application of mustard may be used over the ovarian regions.

If these measures fail, direct means of stimulus to the uterus or ovaries may be tried. A Faradic current may be

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passed through the uterine and ovarian regions every day or every other day. The electrodes may be placed, one over the sacrum, the other over the ovarian regions alternately, or one rheophore may even be introduced into the uterus. The uterine sound may be used from time to time as a mechanical stimulus, or, with due precautions (see p. 37), the cervix may be dilated from time to time by a tent. The most powerful means of all, however, is the introduction of an intrauterine stem, and especially of the galvanic stem of Simpson, the upper half of which is made of zinc, the lower of copper. The effect of this is rather that of a chemical than an electrical stimulus, owing to the constant slow production of chloride of zinc, although doubtless a weak galvanic current over the surface of the uterine mucous membrane is produced. A modified form of galvanic pessary, in which the zinc and copper are arranged side by side in the form of a spiral coil of wire, is more readily tolerated, since it allows the uterus more mobility. The precautions already detailed as to the use of intrauterine stems (see p. 105) must be observed; and, on account of the corrosion and consequent roughening of the zinc, the stem should not usually be left more than about three weeks at a time without removal. When the galvanic stem is not tolerated, either an expanding (Fig. 38) or simple straight stem may be borne. In some cases Dr. Greenhalgh's elastic stem (Fig. 37) is tolerated better than any other form. In cases of decidedly imperfect development of the uterus, not too extreme in degree, in which all other means are likely to fail, the prolonged use of a stem may lead to gradual enlargement of the organ.

Besides aloes, which influences the uterus from the sympathy of that organ with the rectum, some other drugs have the repute of being direct emmenagogues. Of these the most effective appear to be oil of savine, in doses of from five to ten minims, and the tinctura hellebori, in doses of

twenty or thirty minims. Ergot is also reputed to act as an emmenagogue in certain cases, as well as a hæmostatic in excessive menstruation. All these drugs, however, are apt to prove disappointing, and can hardly be expected to produce any effect when the development of Graafian follicles is altogether wanting.

In chlorosis and other forms of anæmia, direct emmenagogues should not be used until full trial has been given to treatment by iron, with other tonics, and hygienic measures. In obstinate cases, stimulation by heat and external applications every four weeks may be tried, or the Faradic current may be passed through the ovarian regions.

SCANTY MENSTRUATION generally depends upon causes similar to those which produce amenorrhœa, but acting in lesser degree. It is to be treated in a similar manner.

MENORRHAGIA AND METRORRHAGIA.—By the term menorrhagia is meant an excessive loss of blood from the uterus at menstrual periods; by the term metrorrhagia, a loss during the intervals, or of such an irregular kind that no monthly periodicity can be detected. The following are the main causes of menorrhagia and metrorrhagia: (1) A morbid condition of blood, such as is found in Bright's disease, in some forms of simple malnutrition, and in febrile affections, especially those of a zymotic kind. (2) A general undue relaxation of the vessels, or diseased condition of their walls, the result either of hæmophilia, of general debility, of the effects of a hot climate, or any other cause. (3) General active hyperæmia, the result of constitutional plethora or excessive arterial pressure. (4) Passive hyperæmia, whether general, as from obstructive heart, lung, or liver disease; or local, as from the pressure of a tumor, or from displacement of the uterus. (5) Want of tone in the muscular walls of the uterus, by the contraction of which the circulation through the organ is normally regulated and controlled. This may result from defective general nutri-

tion, or from a morbid local condition. (6) Local active hyperæmia. This may depend upon the retention of a portion of placenta or membranes within the uterus; upon inflammation of, or the presence of new growths in, the uterus itself, whether body or cervix, the ovaries, or adjoining parts; or upon mental or mechanical causes, such as sexual excitement or sexual excess. (7) Increased surface of the mucous membrane, resulting from enlargement of the body of the uterus. (8) A diseased condition of the uterine mucous membrane, whether due to inflammation, villous or glandular degeneration, or to new growths, especially to those in a state of ulceration. Another practically useful classification of menorrhagia and metrorrhagia is to divide them into those forms due to a general systemic cause, and those depending upon some morbid condition of the sexual organs. The first of these classes comprises the first, second, third, and a great part of the fourth and fifth of the above-mentioned divisions, while the second includes the remainder.

The amount of blood lost in menstruation varies considerably in different individuals, the difference depending in great measure upon the development and activity of the ovaries. When the ovaries are more active than usual, menstruation commences early in life, and continues late, while the flow is considerable in amount, sexual feelings are strong, and there is a liability to menorrhagia or metrorrhagia, especially soon after the first establishment of the menstrual function, as well as to active hyperæmia of the sexual organs.

Diagnosis.—As a general rule, the symptom of menorrhagia or metrorrhagia is one which calls for local examination. In the case, however, of menorrhagia of only moderate degree in an unmarried girl soon after the age of puberty, such as is a common result of a somewhat excessive ovarian activity, it may be desirable in the first place to try

the effect of general treatment. In investigating the cause
of the disorder all available means of examination should
be used, not only vaginal touch, but bimanual examination,
the sound, and, except in the case of virgins, the speculum.
If the source of the affection is not otherwise discoverable,
and if it does not yield readily to treatment, the cervix
should be dilated, to allow exploration of the cavity of the
uterus.

Treatment.—The curative treatment of the various dis-
orders of the sexual organs, of which menorrhagia and
metrorrhagia are symptoms, has already been considered.
It remains only to speak of the immediate and palliative
treatment, and of the management of those cases in which
no local cause is discoverable. Menorrhagia has occasion-
ally actually produced a fatal result in cases in which no
morbid condition could be detected even at an autopsy,
and hence the primary indication is often simply to arrest
the hæmorrhage.

In the first place, all systemic causes should be treated,
as far as possible, and any general passive hyperæmia re-
lieved, especially by saline purgatives, if any constipation
is present (see p. 158). If hæmorrhage is at all severe, per-
fect rest in the horizontal position, or with the pelvis raised,
should be secured, and all hot drinks or alcohol must be
avoided. The most efficient hæmostatic is ergot. Half-
drachm doses of the liquid extract, or of Richardson's
liquor secalis ammoniatus, may be given in cases of mode-
rate severity. In more serious ones, drachm doses of the
powdered ergot, in the form of fresh infusion, or subcutane-
ous injections (see p. 211) are to be preferred. Next to er-
got in value come digitalis, given in rather full doses (such
as half a drachm of the tincture), and strychnia, either of
which may be combined with the ergot. Quinine acts as a
hæmostatic, if given in very large doses. Cannabis indica
is also useful, especially when the hæmorrhage is associated

with pain. Full doses of bromide of potassium are of value, especially when there is excessive ovarian activity. In very severe hæmorrhage, full doses of opium should be given, and cold applied, except within the first three days of menstruation, at which period the latter means should be avoided as a rule. For the application of cold, sponging with cold water may be employed, or, what is more effectual, ice may be applied to the hypogastrium or within the vagina. Injections of hot water, at a temperature of 110° or 115° F., into the vagina, or by means of an irrigator, into the uterus after dilatation of the cervix, may also be tried, and these are preferable to the use of cold when there is very great depression. If the loss is alarming, the vagina should be plugged, or, by preference, the os uteri should be plugged by a sponge tent. In plugging the vagina, it is best to use long strips of lint or wadding, moistened with glycerin, a piece of tape being attached to those first introduced to facilitate their removal. The strips are to be introduced, one by one, through a cylindrical speculum, the speculum being gradually withdrawn meanwhile, until the vagina is fully distended. The plug should not be left more than twenty-four hours, but may be renewed if necessary. If bleeding still recurs after dilatation of the cervix with a tent, the cavity of the uterus should be swabbed with a styptic fluid, such as the tincture of iodine, the liquor ferri perchloridi, or liquor ferri subsulphatis.* If

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* The liquor ferri subsulphatis of the United States Pharmacopœia, or Monsell's solution, is prepared in a similar way to the liquor ferri perchloridi of the British Pharmacopœia, but the ingredients are so proportioned that the result is a basic ferric oxysulphate. The proportions are (by weight)—Sulphate of iron, 5760 grains; sulphuric acid, 510 grains; nitric acid, 780 grains; Water is added to make up 12 fluid ounces. A less irritating fluid than the liquor ferri perchloridi may also be made by dissolving the solid perchloride in water.

even this fails, styptic intrauterine injections may be used as a last resort, and with due precautions (see p. 196).

After relief of the hæmorrhage, special precautions, particularly with regard to rest, are to be used for several ensuing periods, while any local cause of hæmorrhage should receive suitable treatment. Cold bathing during the intermenstrual intervals is generally beneficial. In menorrhagia dependent on debility or an impaired quality of blood, or that associated with anæmia, provided that there is no active pelvic engorgement or tenderness, prolonged administration of iron in an astringent form, such as the tincture of the perchloride of iron, in combination with ergot, is often of value. In mild cases, when no organic lesion is discoverable, the administration of mineral acids, with cinchona or quinine, may complete the cure.

DYSMENORRHŒA.—The old division of dysmenorrhœa, or painful menstruation, into the neuralgic, congestive, and obstructive forms is still the most useful and comprehensive. Most cases of dysmenorrhœa, however, do not belong exclusively to one or other of these classes, but partake in some degree of the character of two, or even all three of them. The names, therefore, should only be understood as indicating the preponderating element in each case. The neuralgic form probably never exists without some basis in the shape either of undue congestion, or obstructed outflow of menstrual fluid ; a small degree, however, of either of these conditions, which, if the nervous system were healthy, would pass entirely unnoticed, or cause the slightest possible inconvenience, may in some persons not only cause severe pelvic pain, but be the source of irritation which gives rise to distant and reflex pain, as headache, pain in the breasts, in the intercostal nerves, or extending down the sciatic or anterior crural nerves. In such cases the state of nervous system may be the most important condition and that chiefly calling for treatment. Hence the name of

neuralgic dysmenorrhœa may be retained on this understanding, although the congestive or obstructive element may be in all cases the primary one. The morbid state of nervous system which leads to this result may be a peculiarity natural to the individual, especially in those of hysterical predisposition, or it may result from deficient nutrition and deteriorated blood, or from the impression on the nervous system produced by constant or repeated pain, especially the pain of a dysmenorrhœa having some adequate basis in congestion or obstruction.

By some authors separate classes are made of inflammatory, ovarian, and membranous dysmenorrhœa. Inflammatory dysmenorrhœa should, however, rather be regarded as a variety or subdivision of congestive dysmenorrhœa, since in inflammation the pain is mainly due to the concomitant congestion, and it is frequently impossible to draw an absolute line between congestion and inflammation. Ovarian dysmenorrhœa, again, is a variety of congestive or inflammatory dysmenorrhœa, and membranous dysmenorrhœa is one form of obstructive dysmenorrhœa, commonly associated with signs of congestion (see p. 197). Three forms, however, of inflammatory dysmenorrhœa specially deserve attention,—(1) that in which the pain in menstruation is a symptom of fresh and active inflammation, indicated by febrile disturbance, for then it is the inflammation which calls for treatment ; (2) that in which the dysmenorrhœa is the sequel of periuterine inflammation, for here any active mechanical treatment is generally contraindicated ; (3) that in which it is the result of corporeal endometritis, and often forms the most prominent symptom which calls attention to the existence of that malady. Of obstructive dysmenorrhœa it is to be remembered that it does not depend only on the absolute size or straightness of the canal, but largely on the formation of clots or casting off of shreds of membrane, and also

that the available canal of the cervix may be diminished by swelling of the mucous membrane or by spasm of the internal os. Obstructive dysmenorrhœa is also commonly complicated by the addition of congestion or inflammation set up by the irritation of the uterine mucous membrane from retained clots or secretions, with the addition, in the case of flexions, of interference with the uterine circulation.

Diagnosis.—In congestive dysmenorrhœa the pain commences some time before the onset of the flow, generally at an interval of from one or two days to a week, and frequently some degree of pain exists also throughout the intermenstrual intervals. When there is no complicating obstruction, the pain is generally relieved, more or less, soon after the commencement of the flow, or, at any rate, towards its termination. In purely obstructive dysmenorrhœa, the pain does not commence more than a few hours before the appearance of the flow, unless there is very extreme stenosis. It is generally intermittent in character, being dependent in part upon painful uterine contractions. Frequently clots are formed from retention of blood within the uterus, even though its quantity is not excessive. In the intervals symptoms are absent, provided that there is no complication with congestion or inflammation. When pain is markedly increased after the commencement of the flow, although existing for some time previously, it may be inferred that some obstructive element is present, in addition to congestion, since congestion is generally at its height just before the onset of menstruation. A congestive dysmenorrhœa may be suspected to be ovarian, if pain and tenderness are localized in the iliac region, especially when they are associated with reflex pain in the thigh, intercostal nerves, or mamma, and with hysterical symptoms, but physical examination alone justifies a positive diagnosis. If,

however, the pain commences regularly at a certain interval before menstruation, and ceases before the flow begins, it may be almost certainly attributed to difficult ovulation.

The physical diagnosis of the cause of dysmenorrhœa is merged in the diagnosis of inflammation, congestion, displacement, or other morbid condition of the uterus, ovaries, and adjoining parts, or stenosis of the cervical canal or vagina.

Treatment.—Palliative treatment alone remains to be spoken of here, since curative treatment consists in the treatment of the various causes. An essential point is to enjoin the avoidance of all exertion, and, if pain is severe, the horizontal position should be maintained during the period. In congestive dysmenorrhœa saline purgatives should be given just before the period, at which time there is often a tendency to constipation, and full doses of bromide of potassium are useful. In all cases the hot hipbath, or the whole bath, in which the patient should remain for as much as half an hour, affords much relief. Hot applications to the hypogastrium have a similar effect. Considerable alleviation may also be procured by diffusible stimulants, and the milder sedatives. Among the former may be mentioned ether and ammonia, one or both of which may be given with the liquor ammoniæ acetatis.* One of the most efficacious is the favorite domestic remedy of gin in hot water, which tends to increase the flow, as well as to diminish pain, but, for obvious reasons, much caution is necessary in recommending it. Among the most useful sedatives are hyoscyamus or belladonna, hydrocyanic acid, chloral, camphor in five or ten-grain doses, or bromide of camphor in capsules. Apiol, given in capsules, has been highly spoken of. Cannabis indica is very useful,

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* R. Sp. Ætheris Sulphurici, ♏ xxx; Sp. Chloroformi, ♏ xv; Liq. Ammoniæ Acetatis, ℥ss; Aq. ad ℥j.

especially when the flow is profuse, but it has the disadvantage of being uncertain in its quality and effects. Small doses should, therefore, be given at first, and increased up to about thirty minims of the tincture, or two grains of the extract. Asafœtida may be given by enema, if there is much hysteria. Opium and its alkaloids are, of course, the most effectual remedies for the pain, but they should be avoided, as far as possible, in all chronic conditions. They are required, however, in severe cases, especially when dysmenorrhœa is the sequel of peritonitis. They may often conveniently be given in the form of suppository or enema.

The tendency to neuralgia and nervous hyperæsthesia should be treated in the intervals of menstruation by tonic and hygienic remedies, with cold bathing, air and exercise, and sufficient occupation. Marriage is generally beneficial in primary congestive dysmenorrhœa, the result of ovarian irritation without any serious organic lesion. Mild forms of obstructive dysmenorrhœa are also often cured by marriage, followed by parturition. If, however, the marriage prove sterile, as is likely to be the case when the obstruction is considerable, the condition is frequently rendered worse.

CLIMACTERIC DISTURBANCES.—The cessation of menstruation at the menopause is frequently accompanied by constitutional disturbances of a well-known character, which often last over a period of several years. These are to be attributed, not only to the cessation of the periodical active hyperæmia and discharge of blood to which the system has been accustomed for some thirty-five years, but that of the expenditure of nervous energy in a particular direction. The chief phenomena, therefore, are signs of plethora, with transient vascular disturbances, inducing flushings of the face, or feelings of heat, chilliness, or sinking in the epigastric regions and other parts. Vicarious hæmorrhages from the nose and rectum are frequent ; the liability to cerebral

hæmorrhage is also increased. Any previously existing congestion or inflammation of pelvic organs is liable to undergo a temporary aggravation, after which, as a rule, it tends to subside. In many cases, especially when any previous uterine disturbance has existed, the diminution of menstruation is not gradual and progressive, but long periods of amenorrhœa are interrupted by profuse and often prolonged hæmorrhage, which may arouse a suspicion of the existence of cancer.

Irregular discharges of nervous energy are usual, and may take the form of headaches, of epileptiform or apoplectiform attacks, or of hysterical manifestations, in those predisposed to that disorder. In other cases the nervous disturbance takes the shape of irritability or depression, which, when there is a constitutional proclivity, sometimes develops into insanity. Sometimes, again, women seek refuge in alcohol from low spirits, or from the pain produced by pelvic disorders or by indigestion, and the foundation of intemperance is not unfrequently laid about this time of life. With the diminution of sexual activity is associated a tendency to corpulence, and to deposit of fat about internal organs, which is apt to lead to neglect of outdoor exercise. To this cause are partly to be ascribed the digestive disturbances, which often form the most prominent feature of the general condition. They consist mainly of constipation, inactivity of liver, and distension of the abdomen by flatus, with frequent spasmodic and painful contractions of the intestines.

Treatment.—No emmenagogue treatment should be adopted, unless the menopause appear to be coming on at a period very long anterior to the normal age ; nor, on the other hand, should the intercurrent hæmorrhages, which often afford a natural relief, be checked too suddenly, unless signs of anæmia appear. Local examination should, however, always be made in case of undue hæmorrhage,

lest there should be commencing cancer, or an erosion of
the cervix, which at such an age is more likely to form the
starting-point of cancer, and therefore calls the more urg-
ently for treatment. Diet should be rather sparing, and
patients should be urged to take a due amount of outdoor
exercise. The allowance of alcohol should be diminished;
beer, porter, and spirits are to be avoided, and claret or
other light wine alone taken. Occasional venesection has
proved useful, but is hardly an available remedy in the
present state of popular opinion. If, however, epileptiform
or apoplectiform attacks occur, or very severe headache is
associated with an appearance of plethora, leeches to the
temples, or cupping may be employed. Occasional mercu-
rial purgatives are often useful, and saline laxatives, espe-
cially the Hunyadi Janos, or other mineral waters, are to
be taken daily if required. For the nervous disorders, the
bromides form the most useful remedies. For the digestive
disturbances, alkalies, with a vegetable bitter, taken before
meals, or ammonia with aromatics, and a small dose of
rhubarb,* are most generally useful. When, however,
there is much general debility, mineral acids, combined with
tonics, are to be preferred; and nux vomica is often of
value for stimulating the muscular walls of the intestines
(see formula, p. 174).

PSEUDO-CYESIS.—By the term pseudo-cyesis is denoted
spurious or imaginary pregnancy. This is not uncommonly
one of the neurosis of the climacteric period, and its starting-
point is then the enlargement of the abdomen by fat and
flatus, combined with the arrest of menstruation. The
movements of the distended intestines are often mistaken
for the movements of a child, even by women who have the
experience of former pregnancies to guide them. The men-

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* Ammon. Carb., gr. ij; Tinct. Rhei, ℞xxx; Sodæ Bicarb., gr. x;
Syrup. Zingiberis, ℨj; Aq. Menth. Pip., ad ℥j—ter die.

tal condition may be of any degree, from that of a not un-
natural mistake, which is at once dispelled by a medical
opinion, to that of a delusion amounting to monomania,
which is proof against all assurances, and may even persist
for a far longer period than the normal duration of preg-
nancy. The delusion may also occur at other times, espe-
cially soon after marriage, or after illicit intercourse. It
may be entertained even though menstruation continues
normal, or is merely diminished in quantity, the mistake,
in such cases, being generally based upon corpulent or
flatulent enlargement of the abdomen, and imaginary
fetal movements. The breasts in some cases are actually
developed, and secrete a mucoid fluid, as in pregnancy,
though in others the supposed enlargement is simply due to
fat. The apparent enlargement of the abdomen is often
increased by arching of the back and rigidity of the abdom-
inal muscles.

The diagnosis is generally easily made by the recognition
of the small size of the uterus on bimanual examination,
and by resonance of the abdomen, although this may be,
in some measure, diminished by great thickness of fat.
The administration of an anæsthetic will clear up any
doubt, and the formality of this proceeding, combined
with that of a consultation, is often of use in dispelling the
patient's illusion.

DYSPAREUNIA AND VAGINISMUS.—By the word dyspa-
reunia is signified pain or difficulty in sexual intercourse.
This symptom is frequently that which leads patients to
seek for medical relief, although often they do not mention
it until questioned on the subject. It is, therefore, generally
desirable in the case of married women to make inquiry on
the point when any condition is discovered likely to lead to
such a result. A vaginal examination will generally reveal
whether any obstruction exists due to a rigid, or imperfectly
ruptured hymen, to narrowness, cicatricial contraction, or

spasm of the vagina : also whether the vagina is unduly short, or the uterus displaced, and whether the tenderness which causes the symptoms is situated at the vulval outlet, the urethra, the vagina, the cervix or body of the uterus, or the ovaries, or is due to periuterine inflammation or tumor. If the tenderness is found to be at the vulval outlet, a careful visual examination with a good light should be made as to its cause, which may be found in some vulvitis, erosion, fissure, or urethral caruncle, which would escape detection by the finger. The treatment will depend upon the cause which may be discovered, and should, in almost all cases, include abstinence from any attempt at intercourse for a considerable period. It should be especially remembered that any partial retroversion of the uterus, by which its canal is brought nearly into a line with that of the vagina, exposes the cervix to a direct impact to which it is not normally liable, and that this effect is increased if there is any concomitant prolapse.

The word vaginismus denotes a spasmodic contraction of the sphincter vaginæ, or pubo-coccygeus muscle, which takes place upon any attempt at intercourse, and renders intromission difficult or impossible. The same effect is frequently produced by the introduction of the index finger, or even by touching the vulval outlet with a camel hair brush. In severe cases the spasm does not only affect the sphincter, but the muscles of the whole body are thrown into intense energy of resistance by the mere idea of any contact with the vulva, so that intercourse could only be accomplished by absolute violence. In some women who have an excessive nervous dread of the consummation of marriage, even the first attempt at intercourse may be thus prevented. In the great majority of cases, however, two causes are present, a local cause of irritation at the vulva, and a hyperæsthesia of the nerves of that region, almost invariably associated with an extreme general reflex susceptibility, dependent upon, or

closely allied to, the hysterical temperament. The most characteristic cases of vaginismus are those which show themselves from the commencement of married life. The mental distress which is apt to follow often leads to great depression of spirits, and impairment of general health. Usually there is no suffering apart from coitus, but sometimes the vulva becomes so hyperæsthetic that sitting and walking are painful, and the patient is reduced to complete invalid life. The condition most commonly found as a cause of vaginismus is a vulvitis, most intense towards the posterior part of the vulval outlet, affecting especially the anterior surface of the hymen or its remnant, and sometimes associated with fissures or erosions. This may arise from some original disproportion of parts or awkwardness on the part of the husband : not unfrequently there is in addition a communication of contagion from a latent gonorrhœa ; while in other cases there was a vaginitis or vulvitis existing before marriage, often dependent on the irritation of a uterine leucorrhœa, due to flexion or other cause.

Vaginismus may also be set up by follicular vulvitis, by lacerations of the vaginal or vulval outlet resulting from parturition, by urethral caruncles or other growths at the vulva, or by granular inflammation at the meatus urethræ. The form of superficial ulceration described by Dr. Matthews Duncan as a cause of the affection has been already mentioned (see p. 329). Mr. Lawson Tait describes, as a frequent cause of vaginismus in women over forty, a local atrophy of the mucous membrane, producing red spots, which are excessively tender in consequence of the exposure of nerve fibres through atrophy of the other tissues. This is said to be incurable, to lead to gradual contraction of the vulva, and to be only capable of palliation by occasional applications of strong carbolic acid.

Treatment.—In all cases of vaginismus, and in many of those of dyspareunia even without vaginismus, the intro-

duction either of cold cream or other oily substance or of glycerin into the vagina before intercourse is a valuable palliative, since whenever there is pain on intercourse or even a mere absence of sexual feeling, the natural lubricating secretion, poured out abundantly under the influence of emotion, is apt to fail. In mild cases this plan, together with temporary sexual abstinence, and the treatment of vulvitis or vaginitis by the methods already mentioned (see pp. 325, 328) will prove sufficient. In a more severe case the patient should be placed under anæsthesia, and unless the vaginal outlet is then found to be capacious, it should be fully stretched by the fingers, and a full-sized Sims's vaginal dilator of glass (Fig. 63) should be introduced. This should

Fig. 63.
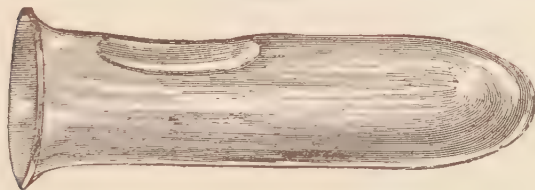
Sims's Vaginal Dilator.

at first be worn all day, if possible, the patient being kept in bed; afterwards it may be worn for some hours each day, while the treatment of any vulvitis, fissures, or erosions is continued. If this plan fails to effect a cure, after all erosions or lacerations have healed, a careful examination by probe or camel hair brush should be made, to discover which are the sensitive points. If these prove to be chiefly the remnants of the hymen, Sims's operation should be performed. This consists in dissecting away completely with scissors the whole circuit of the hymen, whether inflamed or not. After the operation the glass dilator should be immediately introduced, and worn for some time. The most

hopeless cases are those in which little or no inflammation can be discovered, but the condition is one of *hyperæsthesia of the vulva*, affecting not only the hymen, but the nymphæ, vestibule, and clitoris, and apparently depending upon a perverted character of the nerves of sexual feeling. This state may produce incurable dyspareunia, even when there is no vaginismus, and may resist, not only Sims's operation, but repeated parturition, the application of strong caustics, and even the dissecting off of the whole of the sensitive mucous membrane. Generally those cases are curable in which the vaginismus arises from inflammation, or in which the hyperæsthesia is limited to the hymen, although many months of treatment and of sexual abstinence may be required. Sometimes parturition may effect a cure by effectually dilating the vagina, but severe forms of the affection generally persist notwithstanding.

ABSENCE OF SEXUAL FEELING, apart from any dyspareunia, is so dependent upon emotional conditions as to be little amenable to medical treatment. When primary it is often the result of individual peculiarity, but treatment is more frequently sought when it is secondary and acquired. If not associated with a premature menopause, it is more often dependent upon constitutional debility, anæmia, anxiety, or overwork, than upon local causes, and the only remedy is to be found in the removal of these conditions as far as practicable. Among local causes may be mentioned an undue relaxation of vagina, due to subinvolution of that canal after delivery, or to rupture of perinæum or prolapse of uterus or vagina; and a want of muscular tone in its walls, associated with chronic leucorrhœa. These causes may be capable of removal.

STERILITY.—For the occurrence of conception with the greatest possible facility, it is necessary not only that there should be no deficiency on the part of the male, no dyspareunia or vaginismus, that the ovum should be properly

formed and conveyed by the Fallopian tube, and that the
uterine mucous membrane should be in a fit state to receive
it, but also that the cervical canal should have its normal
patency, straightness, and relative direction, should not be
obstructed by a plug of mucus too tenacious to be dis-
placed during coitus, and that neither the vaginal nor uter-
ine secretion should have undergone any change rendering
it adverse to the life of the spermatozoa. As a rule, the
spermatozoa live only for a few hours in the acid vaginal
secretion, while in that of the cervix or body of the uterus
they may remain alive for a considerable number of days.
The direction of the cervical canal should be nearly at right
angles to that of the penis, and it is probable that normally
the semen makes its way for a considerable distance into
the cervix almost at the moment of ejaculation, not through
any active suction by the cervix, nor by exact apposition of
the os uteri to the male urethra, but by a mechanism which
is sufficiently obvious. Hence the occasional failure of vagi-
nal injections after coitus as a prophylactic against preg-
nancy. If the direction of the os is changed, as in the case
of retroversion or cervical anteflexion, so that it does not
dip into the pool of semen in the posterior cul-de-sac, or if
the external os is very narrow, or the canal plugged by
mucus, this mechanism is interfered with.

These causes of sterility, as well as stenosis or flexion near
the internal os, do not render conception impossible, but
only diminish its probability. In some cases spermatozoa
have effected impregnation by making their way even from
outside the vulva through an intact and narrow hymen, or
by passing an almost complete atresia of the vagina. If,
however, they have not free access to the cervix, there is
much greater probability of their perishing in the vagina
before they can enter it, especially if the vaginal secretion
is more adverse than usual to their life. The occurrence
of the sexual orgasm on the part of the woman is not nec-

essary to conception, but probably favors the entrance of the semen into the cervical canal. As a rule, acid solutions are injurious to the vitality of spermatozoa, and saline and very weakly alkaline solutions may tend to promote it, while of injurious fluids few have a more fatal influence than plain water in sufficient quantity. Hence, if the vaginal secretion has an acrid quality, a vaginal injection before intercourse of a solution containing one per cent. of common salt and one-tenth per cent. of caustic soda or potash, may tend to promote conception.

Among the commonest causes of primary sterility is an imperfectly developed uterus, with a small external os and cervical anteflexion. In this case the sterility often persists even after the canal has been made patent, a result which is probably due to some other congenital imperfection less easily remedied than the shape of the cervix. Other frequent causes are vaginismus, or any other form of severe dyspareunia, displacements of the uterus, fibroid tumors, stenosis of external or internal os, vaginitis, and cervical and corporeal endometritis. One of the most important causes of incurable sterility is distortion, obstruction, or atresia of the Fallopian tubes, due to adhesions resulting from pelvic peritonitis. Gonorrhœa has thus a very important influence as an indirect cause of sterility through the medium of peritonitis, as well as through that of vaginitis and endometritis. The views of Noeggerath as to the incurable character and important sequelæ of gonorrhœa have been already mentioned (see p. 185). Besides the causes of sterility depending upon the wife it may happen that spermatozoa are absent in the semen, even though there is no apparent impotence in the male, and probably the vitality of the spermatozoa may vary in different cases. There is also evidence to show that there may be a relative sterility between husband and wife, each being capable of procreation with another person.

Treatment.—The treatment will generally, in this country, be limited to the removal, when possible, of any of the above-mentioned causes, the existence of which may be detected, especially vaginitis, cervical and corporeal endometritis, displacements of the uterus, or stenosis of the cervical canal. Inquiry should also be made as to any sign of impotence on the part of the husband. If children are desired coitus should not take place too often, and any vaginal injection, except that of a saline solution like that already mentioned, should be avoided for some days afterwards. Conception may follow insemination at any period of the menstrual cycle, but is believed to be most probable either just before or shortly after a period; which of these occasions is most favorable is not yet determined.

For a complete investigation of causes it would be necessary to adopt the method of Marion Sims, namely, to examine microscopically the cervical mucus for spermatozoa on the day following coitus, and, if none are then found alive, to repeat the examination at shorter intervals, and, if necessary, immediately after that act. In this way may be established the absence of spermatozoa, their immediate expulsion by the vagina, their rapid death either in the vagina or in the cervix, or their failure to penetrate into the cervix. The method of intrauterine injection of semen has scarcely had sufficient success to outweigh its difficulties and other obvious drawbacks. Out of fifty-five trials made by Marion Sims, on six women, conception followed in one case only.

The treatment of sterility is not very hopeful unless the patient comes under observation while still young, and within a few years from the time of marriage, for, at a later stage, the cause of sterility, whatever it may be, is apt to have led to other alterations, not easily removed. It must be admitted that the treatment of sterility is the least successful part of gynæcological therapeutics, since a complete

study of its origin is generally forbidden by a sense of delicacy.

PRURITUS VULVÆ.—Either associated with vulvitis, simple or follicular, or with any morbid condition of the uterus or vagina, an irritation, itching, or burning at the vulva is a frequent and often a very distressing symptom. Sometimes it is combined with a general hyperæsthesia, especially of cutaneous nerves. It is not uncommon in pregnancy or as a symptom of commencing cancer, and is promoted by all causes of active or passive hyperæmia of the sexual organs. It is also common in diabetes, or may be dependent upon a gouty diathesis. Any eruption around the vulva, pediculi about the pubes, or thread-worms wandering from the rectum, are also among its causes. The itching may extend to the vagina, the anus, and the adjoining skin. It is generally much aggravated by warmth, and hence may render sleep at night almost impossible, while the effect upon the nervous system of the constant or frequently recurring torment is often very severe. In other cases the sexual irritability which results is a source of great annoyance, or may give rise to the habit of masturbation. The scratching excited by the itching aggravates the malady, and is apt to produce vulvitis, if none existed previously. Pruritus vulvæ thus partakes, in great measure, of the character of a neurosis, but in a considerable proportion of cases it is excited by some discharge, either uterine or vaginal, which either sets up actual vulvitis, or at least irritates the terminations of the nerves.

The **Treatment** consists in the discovery and removal of the cause. Endometritis is to be especially sought for if no other is readily discoverable. In all cases, diet should be sparing, alcohol and spices should be avoided, and extreme cleanliness observed. As a temporary palliative, warm hip-baths at intervals of a few hours are of use. If uterine or vaginal leucorrhœa is the exciting cause, very frequent

vaginal injections, used in an effectual manner (see p. 175), are to be recommended, and a tampon of cotton-wool, soaked in glycerin containing acetate of lead or borax, may be kept constantly in the vagina. The vulva, if not itself much inflamed, may be protected by unctuous applications, of which the best is vaseline, to which may be added acetate of lead (℥j ad ℥j), with acetate of morphia (gr. x ad ℥j), chloroform (℥ss ad ℥j), or dilute hydrocyanic acid (℥j ad ℥j). If there is actual inflammation of the vulva, it is preferable to keep between the labia a pledget of lint soaked in a lotion containing glycerin (℥j ad ℥j) and carbolic acid (gr. iv ad ℥j), to which may be added acetate of morphia (gr. ij ad ℥j), or dilute hydrocyanic acid (℥ss ad ℥j), or a combination of the two. Carbolic acid and glycerin may also be combined with the liquor plumbis subacetatis dilutus. A solution of perchloride of mercury (gr. iv ad ℥j) is also a remedy of repute. Any constitutional disorder must be treated, saline laxatives being generally of use. Bromide of potassium in full doses is often valuable, and opiates, or chloral must be given to secure sleep in severe cases. When the neurotic element is predominant quinine or arsenic may be of service.

COCCYGODYNIA.—By coccygodynia is meant pain in the situation of the coccyx. It is generally accompanied by tenderness, and is greatly increased by any movement of the sacro-coccygeal joint, or the muscles attached to the coccyx. It is thus generally most acute on defecation, and on sitting down, or rising from the sitting posture. Sometimes pain is also felt on walking or while sitting. Coccygodynia is either a symptom of disease of the coccyx or of its articulation, or it may be, like pruritus vulvæ. a neurosis depending on any source of irritation in the sexual organs, anus, or rectum. In the former case it is generally either the result of injury during parturition, or one received from without or by horse exercise. In the form of

a neurosis, the affection is not uncommon in single women. For diagnosis, the coccyx should be explored between one finger in the rectum and another used externally. The detection of actual inflammation of the coccyx itself or of its articulation respectively will be assisted by the degree of tenderness of the bone itself on pressure, or of the pain produced by moving it. When there is no history of any cause likely to have produced inflammation, careful search should be made for a source of reflex irritation.

Treatment.—In the neurotic form of the affection, the chief object is to cure the primary cause. Subcutaneous injections of morphia over the coccyx afford relief. When any local inflammation is diagnosed, leeches may be applied over the seat of pain, followed by repeated counter-irritation. In very obstinate cases a tenotomy knife may be introduced at the tip of the coccyx, and the bone severed from its attachments posteriorly and along its lateral border by subcutaneous incision. If this fails, the whole bone may be excised. The latter plan is preferable if the pain is a sequel of actual dislocation, fracture, or anchylosis of the bone. It is only in exceptional cases, however, that surgical interference is desirable.

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